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7th Year of Publication

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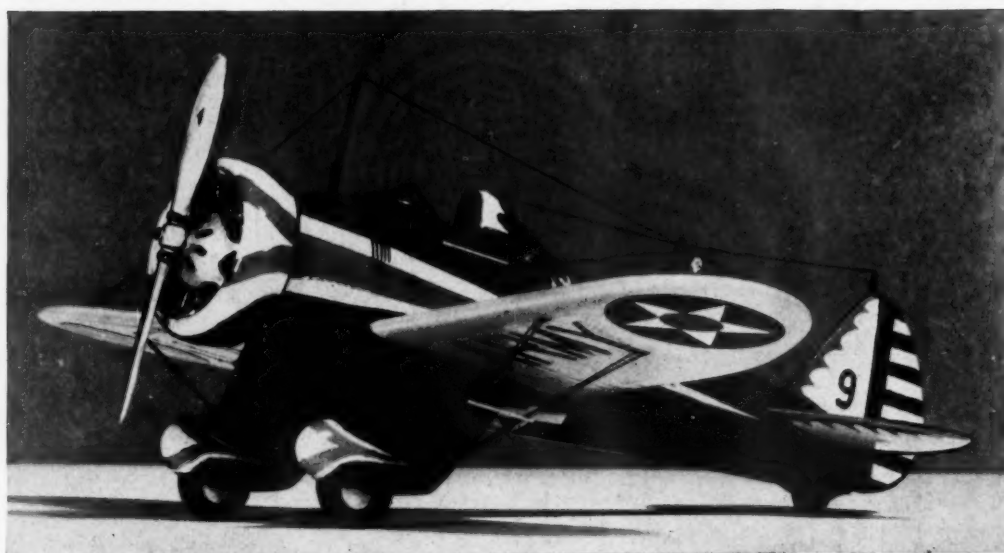
HAWK!!

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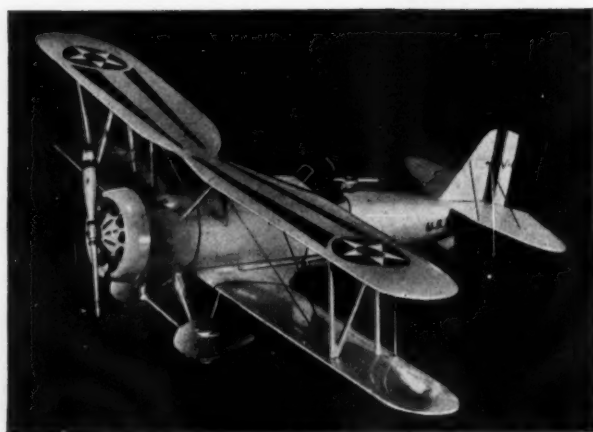
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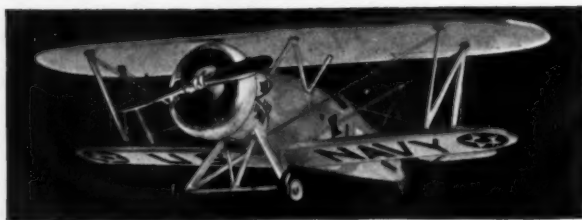
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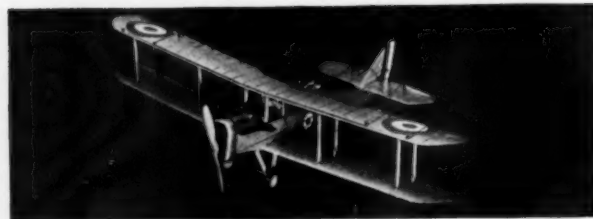
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Model AIRPLANE News

7th YEAR OF PUBLICATION

VOL. XIII

NO. 5

Edited by Charles Hampson Grant

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In Our Next Issue

We are going to please model builders who like 3 view drawings by giving six most unusual sets of 3 view plans; two detail drawings, one of the world's land record holder, one of Art Chester's Racer and two wartime ships. Don't miss these.

In Sopwith Airplanes of "The War," Mr. Puglisi gives more intensely interesting information about these famous British airplanes.

Jesse Davidson gives you an exceptionally fine monocoque flying scale model to build in Build and Fly the "Ryan Low Wing."

On the Frontiers of Aviation, by Robert Morrison, gives you interesting data on the latest airplanes.

How to Design Your Model Planes, by Charles Hampson Grant, is the first article which tells you how to use the information given in all previous articles of this series to design successful models.

Other articles as Air Ways, Aviation Advisory Board, A Record Breaking "Indoor" Plane, Helpful Hints and How to Test Hop Your Gas Job, give you a wealth of interesting and useful information.

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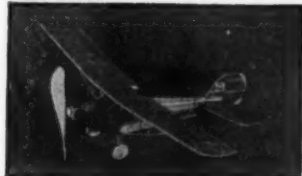
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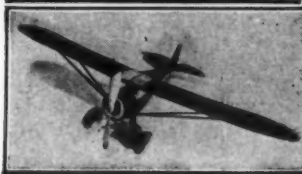
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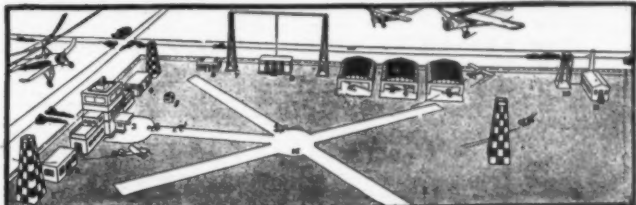
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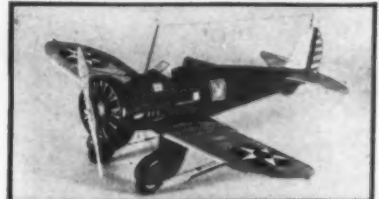
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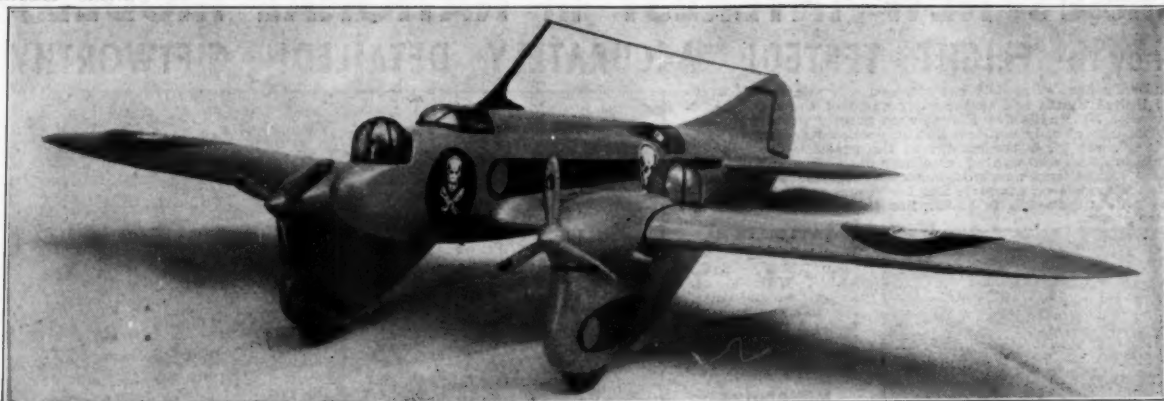
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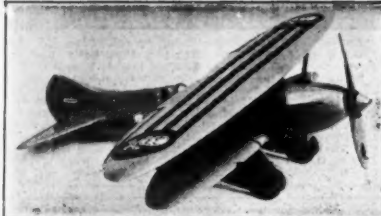
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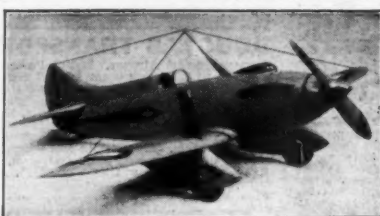


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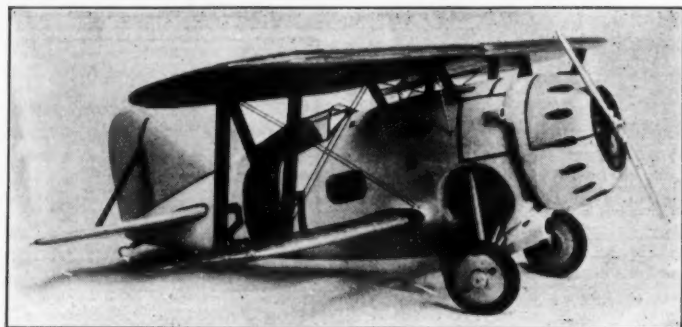
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|------------------------|----------------------------|
| 6" Mason Fighter | 7-1/2" Boeing F4B-4 |
| 5" Vickers Jockey | 6-1/2" Boeing P20 |
| 7-3/4" Waco D. Pursuit | 7-3/4" Berlin Joyce P-85 |
| 7-1/2" Hawker S. Fury | 7-1/2" Hawk P6-E |
| 8-1/2" Curtiss Falcon | 7-1/2" Northrop Fighter |
| 9-1/2" Consolidated | 11-1/4" Douglas Y-10-43 |
| 7" Grumman 1-place | 8" Chrome Fighter M-22 |
| 7-1/2" Curtiss Goshawk | 8" Chrome Pursuit M-23 |
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| | 18-1/2" Chrome Bomber M-21 |

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Plus 5¢ postage, except Bomber which is \$1.00 plus 15¢ postage. Any 4 except Bomber, \$1.50 plus 15¢ postage.

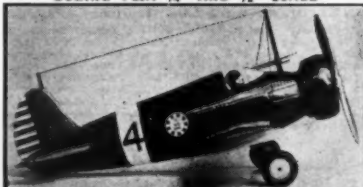


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"Mr." Mulligan DGA-6, winner of the Bendix Trophy Race



Turner's Wedell-Williams which caught fire

Blazing Trails at the National Air Races

In Which the Author Gives You Details of Who Was Who and What Was What at the 1935 Cleveland Air Races

By ROBERT MORRISON

EACH year Cliff and Phil Henderson put on an unparalleled air show called the National Air Races. It is an offspring of the Pulitzer Trophy Races, but it has taken on greater proportions than its "old man"—a sort of winged version of Barnum's good old circus. Everything is in the show but some good sound reasoning, so everyone who attends has a hilarious time. It is similar to the old Gates Flying Circus once headed by the late Ivor Gates and the popular Clyde Pangborn. This circus went from city to city with its wing walkers, parachute jumpers and its crate-like airplanes, but somehow the National Air Races have been stuck at Cleveland Airport for the last few years and only function for four days out of each year—a godsend to those who participate.

This year the Henderson circus tents were opened in a curtain of fog and rain and floated through four full days of thrills, crazy notions and a large financial profit. August 30th, 1935, was its official opening date, its fifteenth annual opening. Practically everyone of notoriety was on hand and they were certainly kept busy hopping mud puddles. Unfortunately, Premier Mussolini was not represented as he had some muscling to do in Ethiopia. However, Hitler sent Gerd Achgelis and his airplane over to give us an idea of the nonsensical flying that is done in Germany. Man could that boy stunt!

France sent their famous Michel De Troyat. Though he made everyone misunderstand him in his own inimitable way (he could speak only French), he put on a wonderful exhibit of flying, rivaled in America only by Al Williams and Milo "Upside Down" Burcham.

I left for Cleveland a few days in ad-

vance so as to get a real eyeful of what takes place during the days preceding the premier air classic. Hopping aboard one of United Airline's luxury Boeing airliners at the Newark Airport I was on my way towards Cleveland's airport. The entire trip took only three hours with superb comfort the whole way.

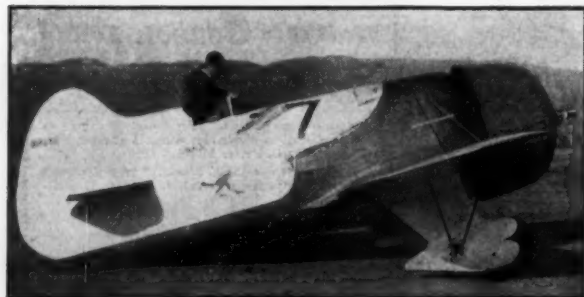
After a good night's rest in Cleveland, I began an early morning tour of the huge field. In one hangar, probably the smallest in the long row of hangars, were all the racers and mechanics jammed in as tightly as bees in a beehive and just about as busy. The last-minute touches were being put on the swift little racers. All were hoping to capture the large cash prizes that were to be offered in the four days to follow. Mechanics were seen scurrying hither and yon, heads kept bobbing in and out of cockpits, and the usual "scram" directed at those who had no business in the hangar was frequently heard.

The plane that caught my eye immediately was the huge Delgado Trades School racer doggedly holding its own as the trades school students climbed about it fixing what had not already been fixed. The ship resembled a huge June bug after climbing out of a pail of red paint. Unfortunately, though clean in design as it

was, its cooling system kept the craft out of the races. After a short hop its engine would heat up so that white smoke belched forth in astounding volume. It laid a better smoke screen than the Marines' Voughts did at the Races last year. At the completion of its first test flight all activity had to be stopped in the hangar until the smoke was blown out and the workers' sight restored. The odor from the overheated engine was enough to force the moths out of Gordon Israel's wrecked racer that was stored in the rear of the hangar, a victim of a deep rut in the field which the plane's wheels were unable to surmount.

All the planes seemed to be in very much better condition than last year. First of importance were the Bendix racers. Roscoe Turner's tan-colored veteran Wedell-Williams was considerably revamped. An entirely new fuselage was built on the plane by the Timm Aircraft Corp., and it housed a new 1935 supercharged Hornet. It was the fastest plane at Cleveland. The windshield was of V-shape design. It cost Turner about \$4,000 to revamp the ship. However, it is still of the same general low-wing design. Roscoe wanted to attempt an assault at the world landplane speed record, but the required course for the speed dashes was not set up this year much to Turner's disappointment. His ship was in fine shape and would unquestionably have broken the record.

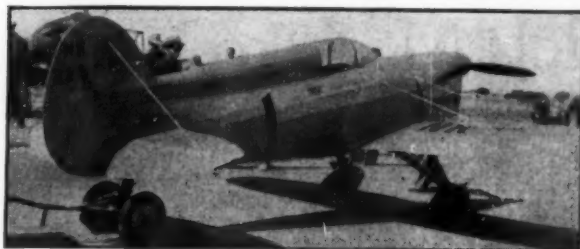
Benny Howard's "Mister Mulligan," the winner of both the Thompson and the Bendix, is one of the finest racers ever built for the National Air Races. Every part of the plane was carefully worked out by mathematical analysis, emphasis being put on perfect streamlining. All small obstacles that might cause "interference"



Cecil Allen in his Gee Bee before his death crash



Earl Ortman and his Rider-Clarke R.3 racer



The fast revamped Miles-Arwood had engine trouble

were eliminated. The Venturi cowl was carefully designed so as to fit snug in the nose, allowing a smooth flow of air to pass along the fuselage. Even the windshield blends smoothly into the clean design, fairing neatly into the wing. The nonswiveling tail wheel is also uniquely housed in the tail of the fuselage and offers scarcely any resistance. All connections are carefully filleted. Benny Howard has a novel way of making the smaller fillets by using modeling cement. Art Chester and other racing pilots also used this method of streamlining their ships with much success. Even the paint on the leading edge of the wing is smoothed down with emory paper before "Mister Mulligan" is entered in a race.

Benny Howard designed the plane for high altitude flying (about 17,000 feet) and therefore thought it was advisable to use a Smith controllable pitch propeller for quick take-off and fast climbing. At this altitude he can get about 300 m.p.h. top speed out of the plane, at sea level almost 285 m.p.h. Oxygen tanks were used for the Bendix dash to allow easier breathing at the high altitude. The ship can carry enough gas to fly from California to Cleveland nonstop under normal flying conditions. Its 500 hp. Pratt & Whitney Wasp Series SE engine consumes 32 gallons an hour with a 14:1 blower gear ratio and a 6:1 compression ratio. Landing speed is slowed down considerably by wing flaps between ailerons and fuselage. They depress 20 degrees.

Mr. Howard made sure his wings would not fall apart. He built them of wood and covered them with plywood as well as internal bracing. An M-12 airfoil section was used with 26 lb. sq. ft. wing loading. The tubular fuselage is fabric-covered except around the cabin where sheet metal is employed. The unbalanced control surfaces are all covered with fabric. Stabilizer is adjustable and is in a slightly negative position. The wire-braced landing gear is

very sturdy and is set in rubber mountings to take up the shock.

The gross weight of the plane is about 4,000 lbs., and it has a wing area of 139 sq. ft.

Benny Howard was skeptical about winning the Bendix race because of the very

during tests with the plane, and it has been difficult to get rid of it.

Lee Wallace of Fort Worth, Texas, has a special clipped-wing Waco which he had hoped to enter in the Bendix, but for some reason it never reached the starting line. The ship is considerably streamlined and is capable of a speed of about 241 m.p.h.

Earl Ortman had the racer of the most modern construction. It was of all-metal construction, covered by large sheets of Alclad which gave the plane a very clean and smooth appearance. Each tail unit is covered by a single sheet of metal. Large trailing edgewise flaps stretch from aileron to aileron. The cockpit enclosure is just wide enough for Ortman's head. In front of it are several tanks for carrying huge amounts of gasoline. The plane was designed by the famous Kieth Rider of the Rider-Clark Airplane Corporation.

Johnny Worthen, who placed second in the Bendix last year, lost his ship on the way out to the Pacific coast. It was the same Wedell-Williams 92 that he flew to third place in the Thompson Trophy Race last year after a steady advance from last place with engine trouble. The name Wedell has long been predominant in the air racing world, but with the sad deaths of both Jimmie and Walter Wedell there are likely to be no more Wedell-Williams planes built.

Seward Pulitzer was on the Bendix entry list but did not start. He flew the course a few days later in his swift stock model Northrop Delta. Russell Thaw flew the Guggenheims' Northrop Gamma which has extra fuel tanks. Roy Hunt flew F. C. Hall's (former backer of the late Wiley Post) standard Lockheed Orion. Amelia Earhart with her co-pilot and mechanic, Paul Mantz, flew her famous Lockheed Vega in the race.

Owen Tilbury, long distinguished as having

(Continued on page 44)



Eddie Allenbaugh's racer caused competitors worry



The Focke-Wulfe German entry with a Siemens Halske motor of 120 hp. which did remarkable exhibition flying. (Kelman Photo)

high speed competition he would be up against. But the long range and dependability of the plane and engine together with the long flying experience of its two pilots, Howard and Israel, were important factors in helping the ship take the \$4,500 first prize. Though "Mister Mulligan" has a cabin large enough to hold four passengers and much resembles a de luxe sport plane, it was able to outdistance all of the small, swift, one-place racers in the Thompson Trophy Race to win first place.

Jacqueline Cochran's Q.E.D. flown by Roy Leonard in the Bendix was fitted with a new Hornet engine of slightly less supercharging than "Mister Mulligan." Wesley Smith, pilot of the plane in the London-Melbourne race, said he did 260 m.p.h. in Roumania with it and expected that the plane would now do about 280 m.p.h., with the new engine. It carries about 400 gallons of gas.

Jacqueline Cochran's Northrop Gamma was fitted with a double-row Wasp Jr. engine supercharged to 1,000 hp. For some mysterious reason a bad vibration occurred



Kling's clipped wing Kieth-Rider won third place



Wittman's racer placed second in the Thompson Trophy Race

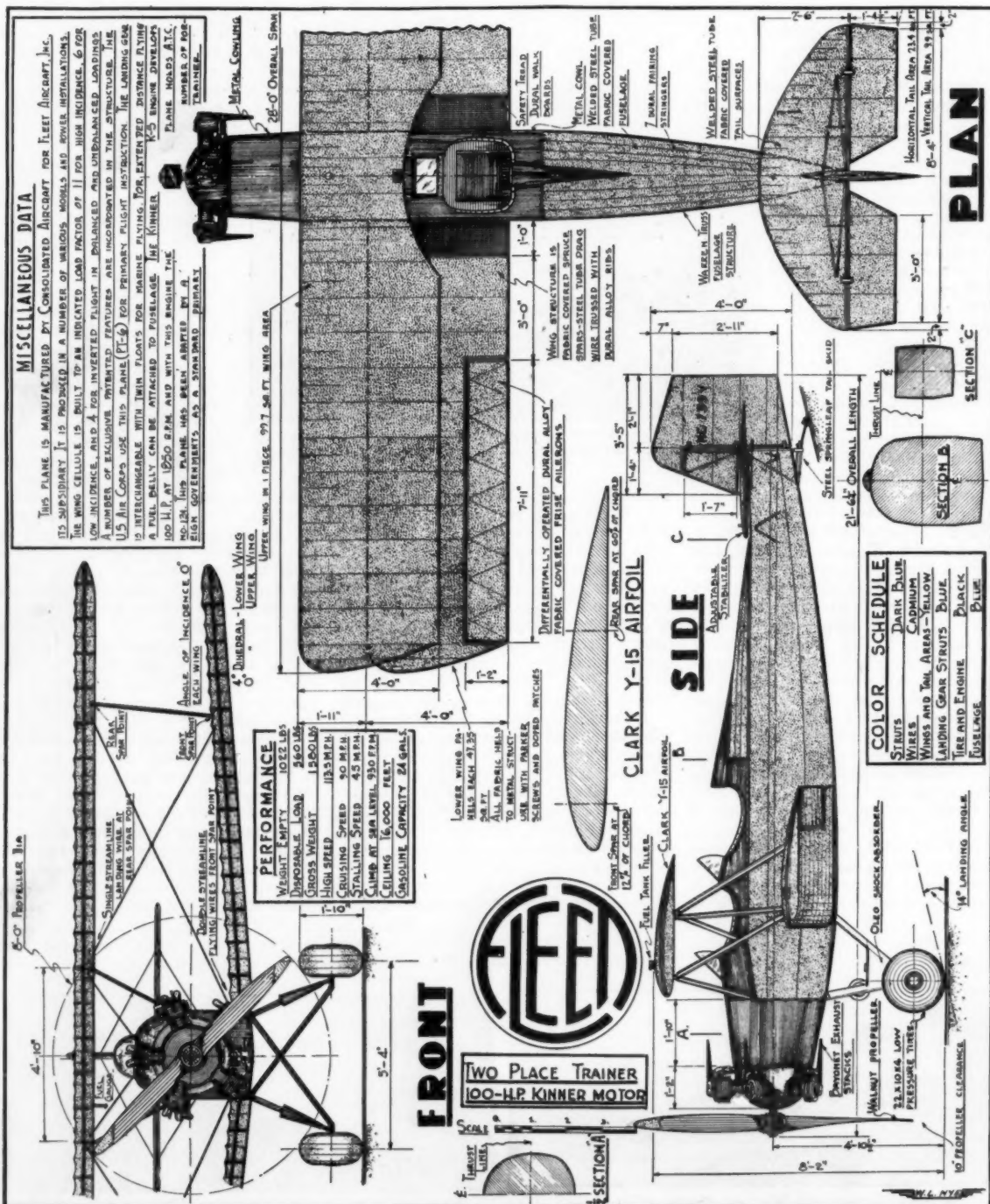
What Do Gas Models Mean to You?

ONE of the most educational, enjoyable, and healthful model plane activities that has ever been developed by young men is "gas" model designing, building, and flying. This sport has been initiated by the young men themselves and has been fostered and promoted by the most advanced and authoritative aviation pioneers in the country, both young and old.

It is educational because it provides a means whereby young men may study problems of aerodynamic design and construction embodied in full-scale aircraft. Obviously there are thousands of young aviation enthusiasts who cannot design or build a full-size plane because of the expense and lack of proper facilities involved. However, they can work out their ideas through the

medium of miniature gas-powered models, which provide the same problems in design as a large ship. It also promotes the young man's initiative and provides a channel for unrestrained intellectual expression, an asset which is rare in educational programs, which usually eliminate this valuable element of experiment.

(Continued on page 42)



High Lights of Progress in "Indoor" Design

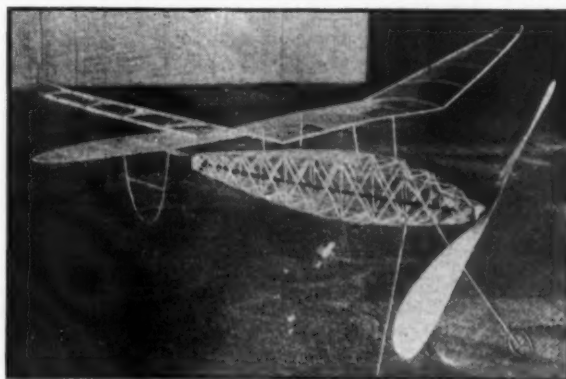
A Resumé of Significant Improvements in the Design of Model Planes and Dramatic Incidents That Have Contributed to Their Development

By HERBERT GREENBERG

THE science of indoor model airplane building and flying is only nine years old, but in those nine years great advances have been made. The crude, clumsy-looking tractor model of 1926 which had a top duration of three minutes, has gradually been transformed into a streamlined, graceful flyer. The duration attained by the present-day tractor is close to twenty-five minutes. On looking back into the past, one realizes just how phenomenal this progress has been. The duration times have been increased each year by not one or two minutes but by as much as four or five minutes.

The question as to what has caused such advancement presents itself. There are a number of factors that are responsible; namely, research, experience and the assimilation of ideas. We indoor builders have seen the flat, rectangularly shaped, paper-covered wing gradually assume an elliptical shape—the most efficient aerodynamical form. The flat airfoil was suddenly discarded to make way for the better cambered airfoil. The first indoor models had flat wings and were quite successful since a flat airfoil possesses a stable center of pressure travel. Cambered wings had been tried but they

seemed to be unstable. It wasn't until Ernest McCoy of Detroit developed his "mystery ship" that cambered wings came to be used exclusively. It took painstaking energy and a great deal of time before the "mystery ship" was perfected,



Fuselage Class B record holder. Time 12 m., 23.5 sec. (Greenberg). Note the diagonal paper fuselage braces and under-slung fin

and one does not wonder that McCoy tried to safeguard his secrets by clapping a box over his indoor model every time it landed after a flight. But it is just as well that the secrets did get out for progress was hastened. Aram Abgarian of Detroit used a ship similar to McCoy's and beat out the latter in the Stout indoor



Greenberg's 1935 record tractor, time 22 m., 11 sec. Note microfilm propeller

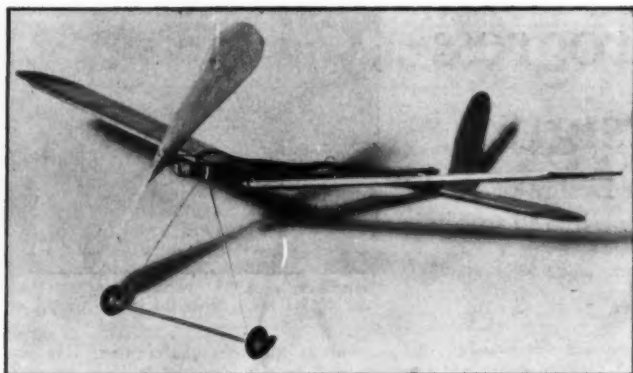
event at the national contest. He was able to do this after he had incorporated a few of his own ideas into the model's design.

The first indoor models were really interesting contraptions. Low wings, covered with a rather heavy grade of Japanese Imperial tissue, were used, and those wings had a moderate amount of dihedral. The first motor sticks were solid, but the advantages of a hollow stick were readily recognized and soon no solid sticks were to be seen on indoor models. The elevator of the first indoor model was kite-shaped and the ratio between its area and the area of the wing was rather small. Consequently, the model was difficult to adjust and usually proved to be too sensitive to obtain consistent flights. One of the original features of the McCoy "mystery ship" was its rectangularly shaped, inverse cambered elevator. The idea for using this was to obtain a steep climb at the beginning of flight when a maximum of power was available, and then to secure a flat glide after the power had given out. This appears to be a makeshift arrangement and possibly it was for that reason that McCoy discarded that design.

(Continued on page 34)

EVOLUTION OF THE INDOOR TRACTOR

<p>1927 - Dybvig Tractor</p> <p>Time - 3:27</p>	<p>1928 - McCoy "Mystery Ship"</p> <p>Time - 5:54</p>	<p>1929 - Culver Tractor</p> <p>Time - 8:33</p>	<p>1930 - Thompson Tractor</p> <p>Time - 11:57</p>
<p>1932 - Goldberg Tractor</p> <p>Time - 14:46</p>	<p>1933 - Goldberg Tractor</p> <p>Time - 19:34</p>	<p>1934 - Stokes Tractor</p> <p>Time - 18:53</p>	<p>1935 - Greenberg Tractor</p> <p>Time - 22:11</p>



A Fine Flyer That's Easily Made

Here Is a Model Plane That Flies Consistently Yet Which Requires Only the Simplest Operations to Complete

By RALEIGH T. DANIEL

TO THOSE who are just beginning in the art of model airplane building or for those who have not yet enjoyed the results of completing a successful flyer, we recommend this model. The design is such that if the instructions are carefully followed, the machine will be easy to make accurately and to true-up. The necessity of obtaining these two conditions cannot be emphasized too strongly as the lack of them is the principal cause of failure to fly properly in all well-designed models.

We believe that many of the more advanced modelists will also want to build this plane because of its rugged construction, ease and economy of building and its consistent and dependable flying qualities. Its climb is remarkable and the stability (model's ability to maintain and regain flying equilibrium) is good.

There is a point which the writer wishes to mention to beginners; namely, the instructions to a working drawing are usually boiled down to a very minimum of words to save space. Hence, those who make up plans and instructions in their work are continually seeking to use expressions arranged in such a way that even the concise, the most logical way for the reader to see it, is the very meaning intended. But don't forget that due to the brief form, the true meaning often has to be "dug out." So it is advised that you study the plans and instructions in a manner to understand them as clearly as possible before starting work. That in general is a practice that will help rocket you to that upper strata of the experts!

List of Material Needed

Motor stick—one $\frac{1}{8} \times \frac{1}{4} \times 14$ " straight-grained hard balsa that resists twisting.

One $\frac{1}{8} \times 3 \times 16 \times 18$ " light balsa.

Two $\frac{1}{8} \times 1 \times 16 \times 18$ " medium hard balsa.

Two $1 \times 16 \times 1 \times 16 \times 18$ " medium balsa.

One $\frac{1}{8} \times \frac{1}{8} \times 7$ " light balsa for stabilizer spar.

One $\frac{1}{8} \times 13 \times 32 \times 4 \frac{1}{2}$ " and one $\frac{1}{8} \times \frac{1}{8} \times 1 \frac{1}{4}$ ", both hard balsa.

One $1 \times 32 \times 2 \frac{1}{4} \times 2 \frac{1}{2}$ " medium or light balsa for wing tips.

One $1 \times 32 \times 1 \frac{1}{8} \times 5$ " medium or light balsa for stabilizer tips and for the fin.

Important:—

A graphical description of how to carve a propeller appears on page 26 of the July issue of MODEL AIRPLANE NEWS. It may be helpful to you

One $1 \times 32 \times 3 \times 32 \times 4 \frac{1}{8}$ " bamboo for landing gear spreader bar.

One 7" diameter machine-cut balsa propeller.

Miscellaneous parts—one length of .028" straight music wire. One pair of $\frac{1}{4}$ " balsa wheels. Six $\frac{1}{8}$ " washers. One bead. One medium-size thrust bearing.

One propeller shaft. One sheet or less of tissue. Six feet of $1 \times 16 \times 1 \times 30$ " rubber thread for the motor. Cement.

The Wing

An old drawing board is ideal to work on or else get a flat and level, preferably wood surface of some kind. Sand the $\frac{1}{8} \times 3 \times 16 \times 15 \frac{3}{4}$ " leading edge spar to a rounded shape on one edge, see fig. 1, end view. Use sandpaper wrapped around a rectangular wood block. Sand the $1 \times 16 \times \frac{1}{8}$ " trailing edge spar on one side to a wedge shape; see fig. 1, end view.

Lay out a full-sized drawing of the wing on your board. Now the wing spars may be put in place directly on the drawing and secured with thumb tacks or weights. Cut the $1 \times 16 \times 1 \times 16$ " wing ribs

to length and cement in place, all except the no. 1 ribs which are not put in until after the dihedral angle is fixed.

Set your compass to scribe a radius of $1 \frac{1}{2}$ " and mark the wing tips on 1×32 " sheet balsa so that the wood grain runs with the wing span. Cut out and cement the tips in place. Be sure that your cement is not too thick, for if it is, it will not penetrate the surface crevices and get a real hold on the wood. Make several applications of cement (allowing time between to dry) on all of the various structures. The wing tips are braced with $1 \times 32 \times 3 \times 64 \times 2 \times 5 \times 16$ " bamboo strips "C" placed on the underside and cemented. It is necessary to cut a notch in rib no. 5 so that the brace may be imbedded in it. The end of the brace punctures into the front spar, see fig. 1.

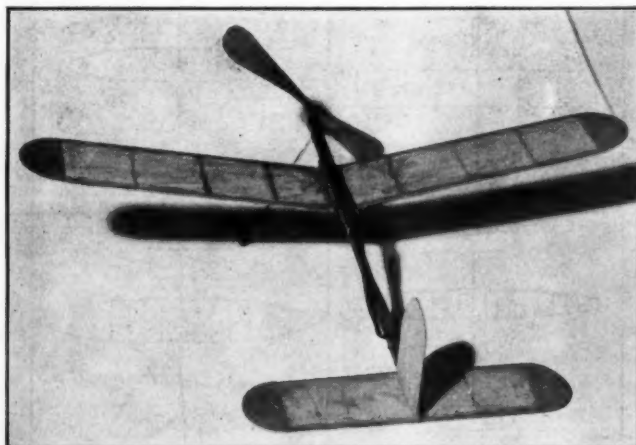
When the wing is dry it may be removed from the board and remember that the top side of the wing was against the board while being made—see the underside structural view in fig. 5.

In order that the model may have lateral stability, the wing tips are raised to give the wing a "dihedral" angle. The method of doing this is clearly shown in figures 6 and 7. The spars are cut halfway through from the underside and cracked up into the position shown.

The wing is now placed on the drawing board and one-half is held down flat with weights. A propeller block is then slid (absolutely straight) under the other wing half until the tip is raised $3 \frac{1}{4}$ ".

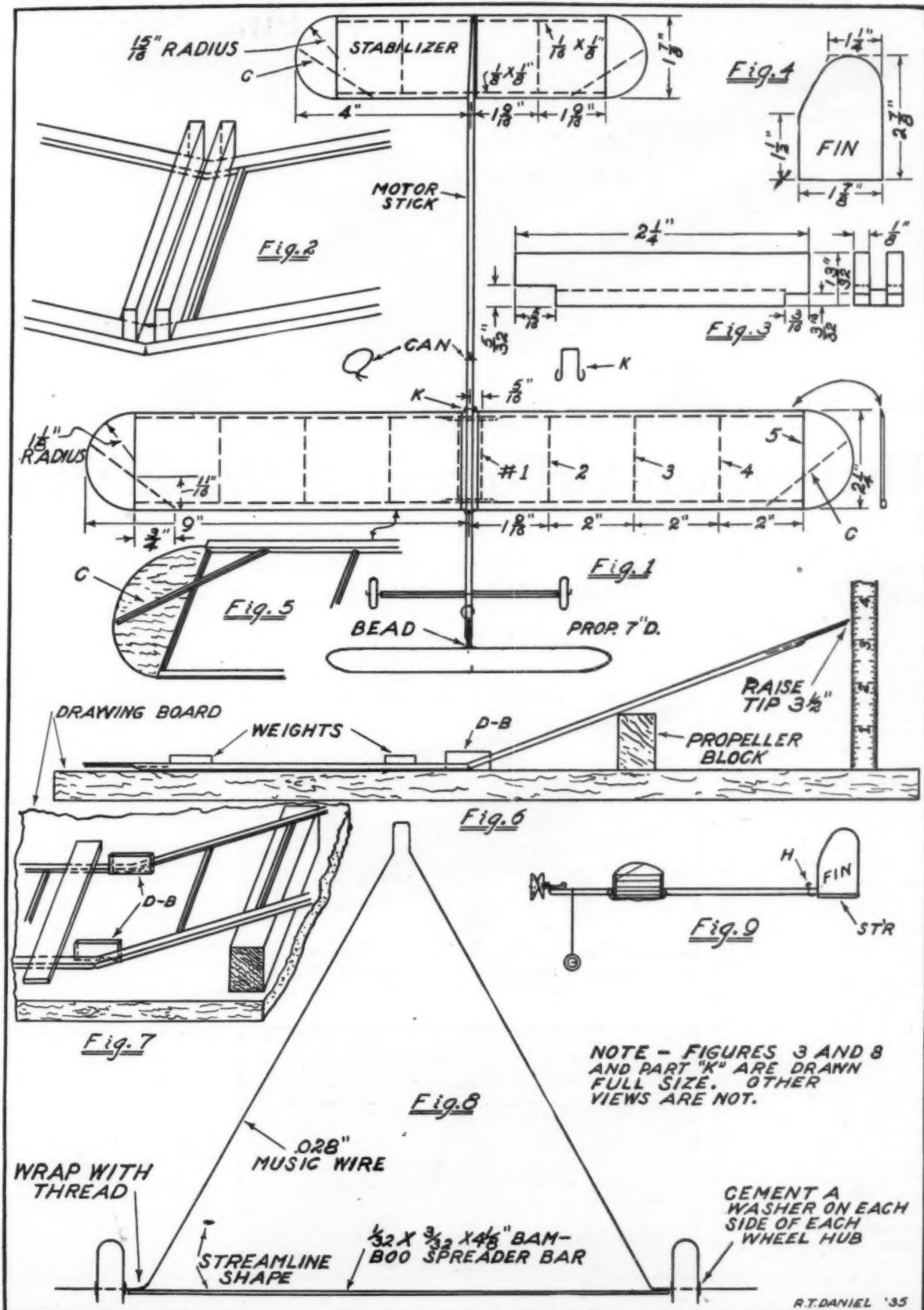
The dihedral blocks "D-B" which are $\frac{1}{2}$ " high by 1" long and 1×16 " thick, hard balsa, are cemented to the inside faces of the spars as in figures 6 and 7, to permanently maintain the dihedral setting. These are thoroughly cemented and when dry the wing is taken up and the blocks "D-B" are trimmed down until they agree in shape with their respective spars. The no. 1 wing ribs are now cemented in place. The top of the wing is covered with tissue, using tissue cement as an adhesive.

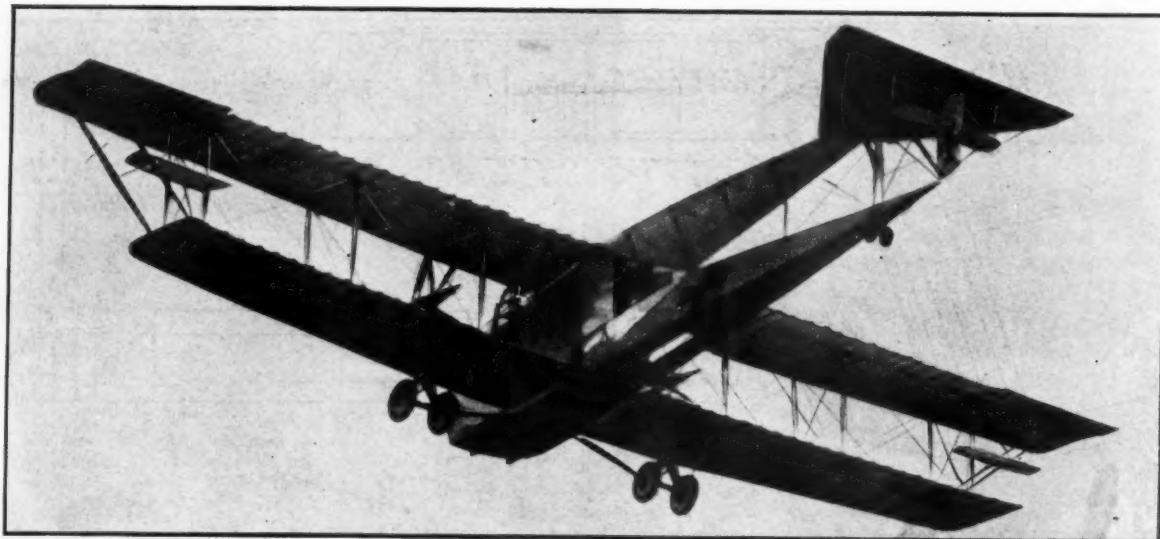
Now make the wing center-block, assembled in fig. 2 and detailed in fig. 3. The center section of the assem-



The pictures show the little ship ready to fly. The large stabilizer gives stability

(Continued on page 32)





A Siemens Steffin R-1 giant bomber. Note the queer fuselage that allows firing to the rear

The German Air Force in the World War

FROM time to time during the World War, the Imperial German Air Force held control of the air, in spite of the concentration of Allied air squadrons to which it was opposed. On the Western Front alone, at the time of the Armistice, there were three hundred and nineteen identified units. A few of these were flights, operating as special units, while the remainder were Staffels, which is the German name for squadrons.

Opposed to this array of war-planes in the zone of operations, England had eighty-six squadrons; France had one hundred and three escadrilles, or squadrons; Belgium had five squadrons; and the United States, forty-five squadrons. The Allied air strength therefore totaled two hundred and thirty-nine squadrons in the zone of advance. Consequently, it may be wondered why and how, this numerical superiority on the part of the Germans.

Right up to the end of the war, with all things considered, the German Air Force was on a par with those of the Allies. Control of the air had switched back and forth time and again, and even late in 1918, in various sectors, the German air units were out in force, as will be testified to by many an Allied pilot. This in spite of the fact that they were by necessity forced to have air units on the Eastern front, and to furnish their own allies, Austria, Turkey, and Bulgaria, with pilots and airplanes.

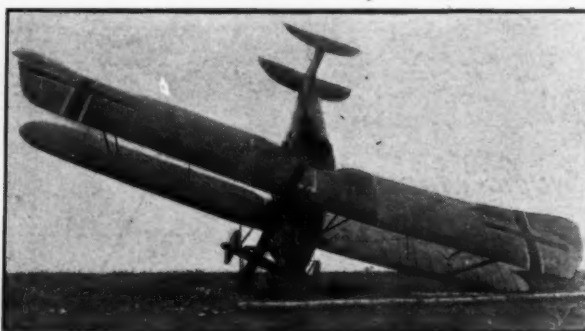
Germany went into the war

A Vivid Account of All Phases of German War Aviation Which Discloses Much Information Heretofore Unknown—Part No. 1

By ALFRED CELLIER



A Rex triplane of late 1918. It never reached the front. Note parachute pack in center section



A Hanover CL-3A ground straffer that was strafed Oct. 4, 1918, Montfaucon, Montfaucon-Meuse, France

with about five hundred aircraft. These were all practically of odd manufacture and consisted of Fokkers, Deperdussins, Bleriot and Taubes, both single and two-seater models. Others were hastily commandeered. From the beginning, it is evident that the Germans had plans for the utilization of their air service. The aircraft which they had were completely equipped, which was not the case in those first Allied ships.

In the beginning, the only use put to the airplane by both sides, was reconnaissance and scouting. As air fighting developed, improved ships came along, and it was mostly a matter of individual combat until the middle of 1916, when aerial combats increased in intensity and number. From then on air fights continued in earnest, and from March until November, 1916, Germany lost six hundred planes.

In March, 1916, General von Hoeppner was assigned as Chief of the Imperial Air Force. Then new ships began to be turned out in quantities, and the service was very much improved. Immediately after the battle of the Somme in 1916, the British Royal Flying Corps had swept the Germans from the sky, but with the reorganization of their air service, they assumed control of the air again, and made things hot for the R.F.C., until the end of "Bloody April," in 1917, when five British pilots died for each German airman who went West.

Only the arrival of the Bristol



A Siemens Schuckert four-engine bomber: Total power, 44 hp.; speed, 95 m.p.h. At the front in 1917

Fighter, the Camel and the S.E.5, saved the Allies from a serious situation at this time, for while the British were stronger in numbers, the Germans were superior in the performance and types of their aircraft. During this time, many a hitherto unknown German pilot became an ace practically overnight.

It is interesting to note the strength of the various air forces as the war continued. By the end of 1916, it was estimated that there were in excess of twelve thousand airplanes engaged in the war in the skies. Of these, Germany had three thousand, Austria had fifteen hundred, while Bulgaria and Turkey had five hundred between them. These latter were all supplied by the Germans, who also furnished most of the pilots for them, while the observers were in most cases, Bulgarians or Turks; a large number of German pilots also served in the Austrian squadrons. Against these, France and England had five thousand machines, while the Russian air service numbered approximately one thousand effective airplanes. The armament of Germany's aircraft were the Spandau and Parabellum machine-guns. Some of the earlier fighting ships were equipped with the Mondragon auto-rifle, which was an infantry weapon of seven m.m.

The employment of long distance bombing by the Germans, from almost the beginning, naturally led to the continual improvement of these huge ships. Allied air officers were surprised on inspecting some of those which had been shot down to find metal fuselages in many of them, in place of the prevailing wooden ones.

During the first few years of the war, when the Allies were using converted artillery shells for aerial bombs, the Germans had developed special bombs for their aircraft. Their Zeppelin "Giant," five-engined bomber, which was constructed in 1918, had a bomb load capacity of four tons and carried a crew of seven men. Its weight empty was twenty thousand pounds. It would be hard to find any modern military bomber today, which carried that same bomb load.

In 1917, with America's entrance into the war, Germany had another air force to combat, the strength of which was not felt until the following year. Larger formations now began to rove the skies, and as a means of combatting this, in June 1918, the German High Command, organized the "Jagdschwaders," or groups of Staffels. These were each composed of four Jagdstaffeln, and consisted of about forty-eight planes.

For the command of these "Jagdschwaders," some of the leading aces were called in. Among these aces, were, Captain Udet, credited with sixty-three victories; Captain Bruno Loerzer, with forty-two to his credit; and Captain Goehring, with ten victories, but admitted to be one of the

greatest air strategists of the war. These units became known to the Allied pilots as "circuses," due not only to the brilliantly painted colors of their ships, but also to the fact that they were moved from sector to sector as needed, to reinforce other German air units, just as a circus travels from town to town.

The Jagdstaffeln, themselves, were commanded and made up of some of the most daring and outstanding pilots who ever took to the air in winged ships. The deeds of Voss, Schaeffer, Allmanroeder, Wolff, Menckhoff, Berthold, Muller, Bongartz, Boehm, and others, will always be remembered where fighting airmen gather. Perhaps the career of Wernher Voss was the

most spectacular of them all. Voss, alone and unaided, flying a Fokker triplane, met his death against odds. Sighting a formation of seven S.E.5s, Voss dove to the attack, well knowing that this unit, number Fifty-Six Squadron of the Royal Air Force, was made up of some of England's leading aces. Among those whom Voss was to meet in his fatal attack on this flight, were McCudden, Rhys-Davids, Maxwell, and Bowman. After twenty minutes of maneuvering, Voss was able to withdraw and probably could have saved his life by doing so. He again plunged into the fight and was shot down by Rhys-Davids, who managed to get on his tail. Skillful as he was, he was no match for the group of aces that he determined to combat. In all, Germany produced one hundred and sixty-seven aces, who had five or more victories to their credit.

For historical reference, some of the air units of the Imperial Air Force, are worthy of mention. Jagdstaffel One, whose airplanes were distinguished by their red noses and wings, was the outfit in which the famous Baron von Richthofen first saw service. It was later under the command of Captain Reinhardt, an ace with twenty victories, on the American Front, from June, 1918, until the Armistice. Jagdstaffel Two was probably the most famous of all the German Staffels, and was familiarly

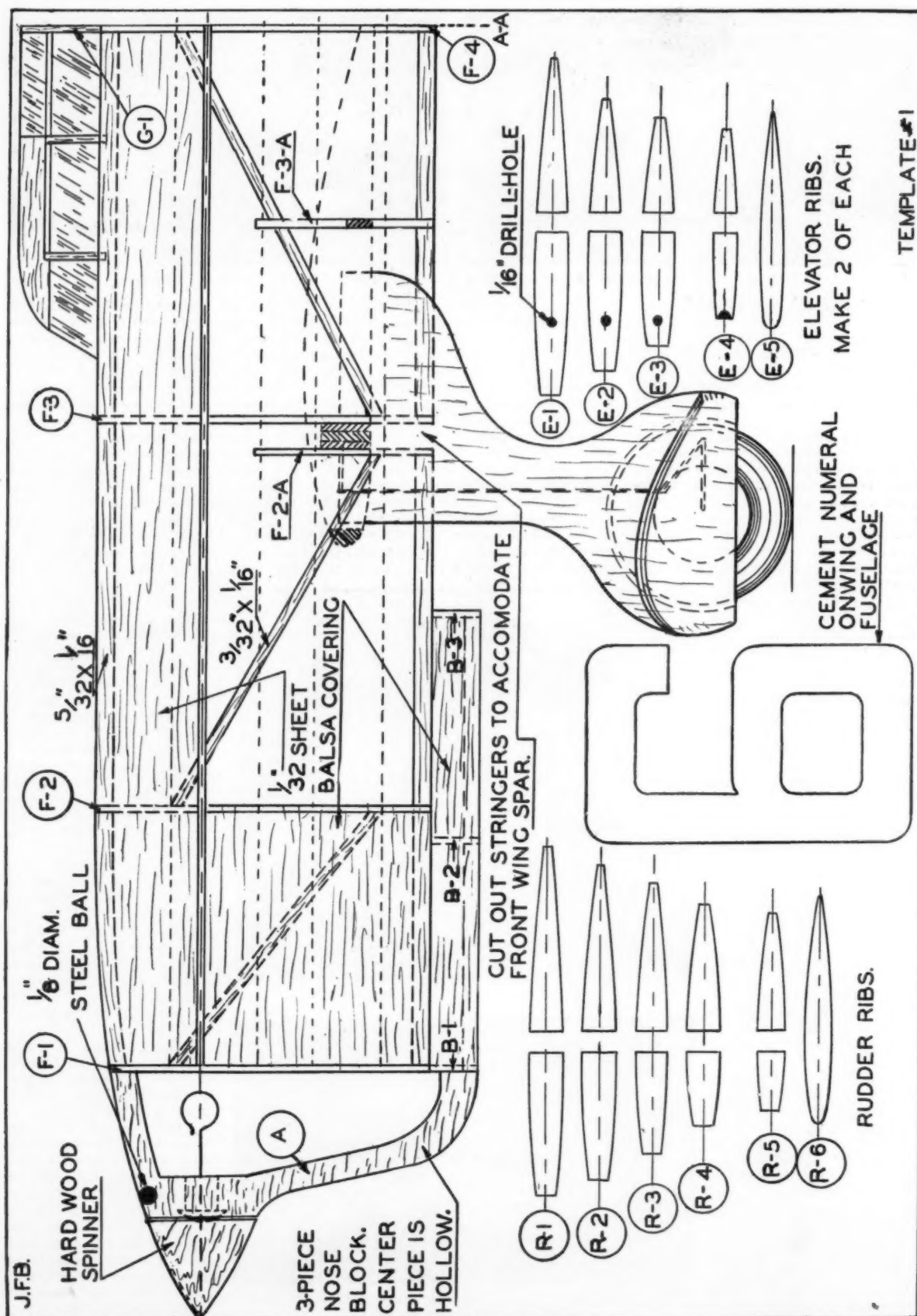
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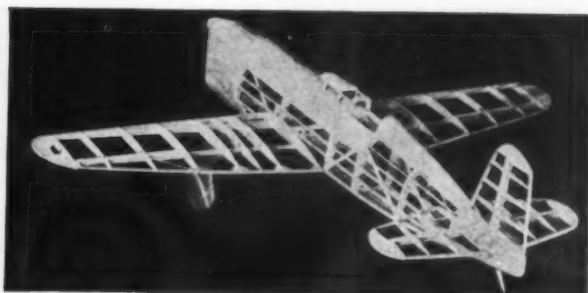
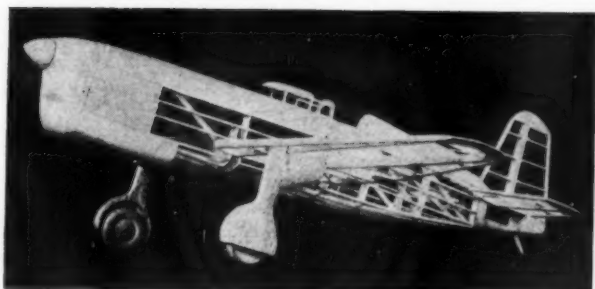


Fokker D.7s on patrol above the clouds



Plane shot down by Frank Luke near Rattantont Sept. 19, 1918. Pilot is under burlap in center





Two views of the completely uncovered skeleton which show great refinement of detail

Build and Fly This Famous Racer

OF ALL the French racing ships of the "Caudron" type, the plane from which the accompanying drawings are copied is the most outstanding, for it holds the present "world's landplane speed record."

There are several interesting features in this ship; namely, an unusually short wing spread; and in contrast, an unusually long fuselage. Also, when in flight the landing gear, which consists of two "half pants," folds inward into the bottom of the fuselage and wing-root. Aside from the above features, it is a cleanly designed ship, having full monocoque plywood construction.

The top speed is over 300 m.p.h. over a measured mile course.

An interesting feature of its facsimile is the speed at which it travels on eight strands of $\frac{1}{8}$ " flat rubber, although not quite duplicating that of its large counterpart to scale.

The plans for this model are full-size and every part is thoroughly described both on the drawings and in the following instructions, so you should have no difficulty in building as good a model as the one shown in the accompanying photo.

Before starting to cut any parts, you should first make a template for each piece, a list of which follows:

- 1—Wing ribs and wing tips
- 2—Fuselage bulkheads
- 3—Head-rest formers
- 4—Tail ribs and tail tips
- 5—Fuselage, tail and nose blocks
- 6—Landing gear
- 7—Belly radiator formers

These templates may be made from cardboard, bristol board or any other stiff material.

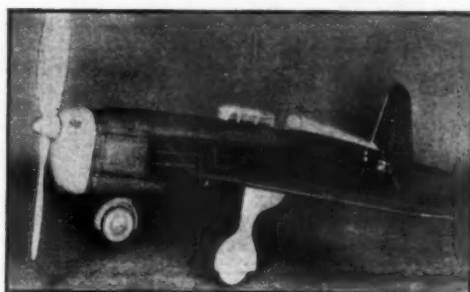
First trace the above parts on transparent tracing paper. Then turn the tracings over on the template paper with the penciled side down. This done, retrace the lines again and when finished you will find that the pencil marks have been transferred to the stiff paper. When this procedure has been finished, cut around the outlines and place each completed template aside.

The Wings

When finished with all the templates, take out the wing rib templates and trace the shape of each one onto 1/16" sheet

How You Can Construct a Flying Scale Model of the Record-Breaking Caudron C.460 of Unusual Grace and Quality

By JOSEPH BATTAGLIA



Though a fast ship, the large propeller insures unusual duration and long flights

balsa. Trace all the parts on their respective sizes of wood and then start cutting each one out.

When through with this operation, put aside all the wing ribs.

The front wing spars are made of $\frac{3}{32}$ " x $\frac{3}{8}$ " at the root, tapering in plan only, while the rear spar is made from 1/16" x 3/16" balsa, tapering only at the outside top to accommodate rib No. 8 as shown in front view.

Cut the spars to the above dimensions and lay them on the top view of the wing panel. Now mark off each rib station on them. When this is done place a sheet of waxpaper over the drawing, lay the spars on it and stick straight pins on either side of them to keep them upright in place.

This done, slide each rib into place and cement it. As one panel is drying, go on to the next, and when you're through with it, place it aside.

By this time the first one should be dry, so take two pieces of $\frac{1}{16}$ " x $\frac{9}{32}$ " x $\frac{9}{4}$ " balsa to form the leading edges. Taper these pieces according to the leading edge size of each rib and cement them onto the front ends of the wing panels. To hold them in place, you can either wrap a rubber band around the wing from the leading edge to the rear spar or drive pins through the leading edge to two or more ribs.

While one panel dries, work on the other, and when this is finished and the first one is dry, take a strip of balsa $\frac{1}{8}$ " x $\frac{3}{32}$ " for the trailing edge, cut it to the proper

length and cement it in place, holding it temporarily with pins. Do the same with the other and allow each to dry.

Now make several small gussets from 1/32" sheet stock as shown on top view of wing panel and cement each one in place. While these dry, cut several short lengths of 1/32" square bamboo strips, drive them into their respective positions and apply some cement to each end.

Now take out the wing-tip templates, trace the outline of each on 1/16" sheet balsa and cut out each wooden piece, after which they are cemented to the outer ends of the wings. While these dry, cut out two pieces of 1/32" sheet balsa for the

covering underneath the wing, between ribs No. 2 and No. 4. Cement each of these in their respective places, holding them down with a few pins.

The ailerons are next. Measure off two pieces of balsa 1/16" x $\frac{3}{4}$ " x 4" to form the aileron spars. These taper to conform with the depth of each rib attached to them and with the shape of the wing where they hinge. Cut them to the proper shape and after marking off the rib stations on each, cement them to the ribs.

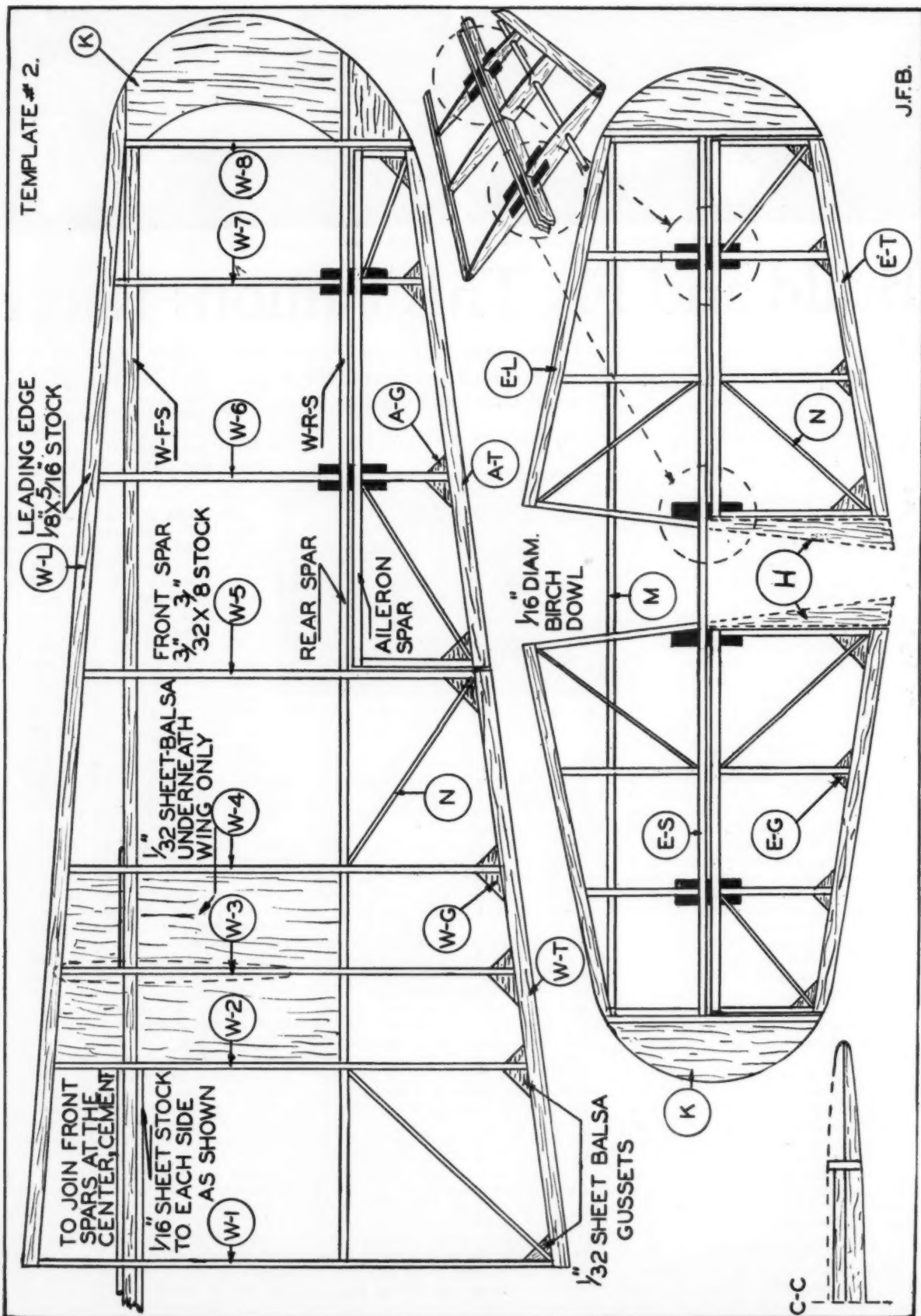
The trailing edges are made from the same size stock as that of the wing, so cut out two pieces and cement them on. Let them dry, then make the gussets and bamboo strips and cement these on also.

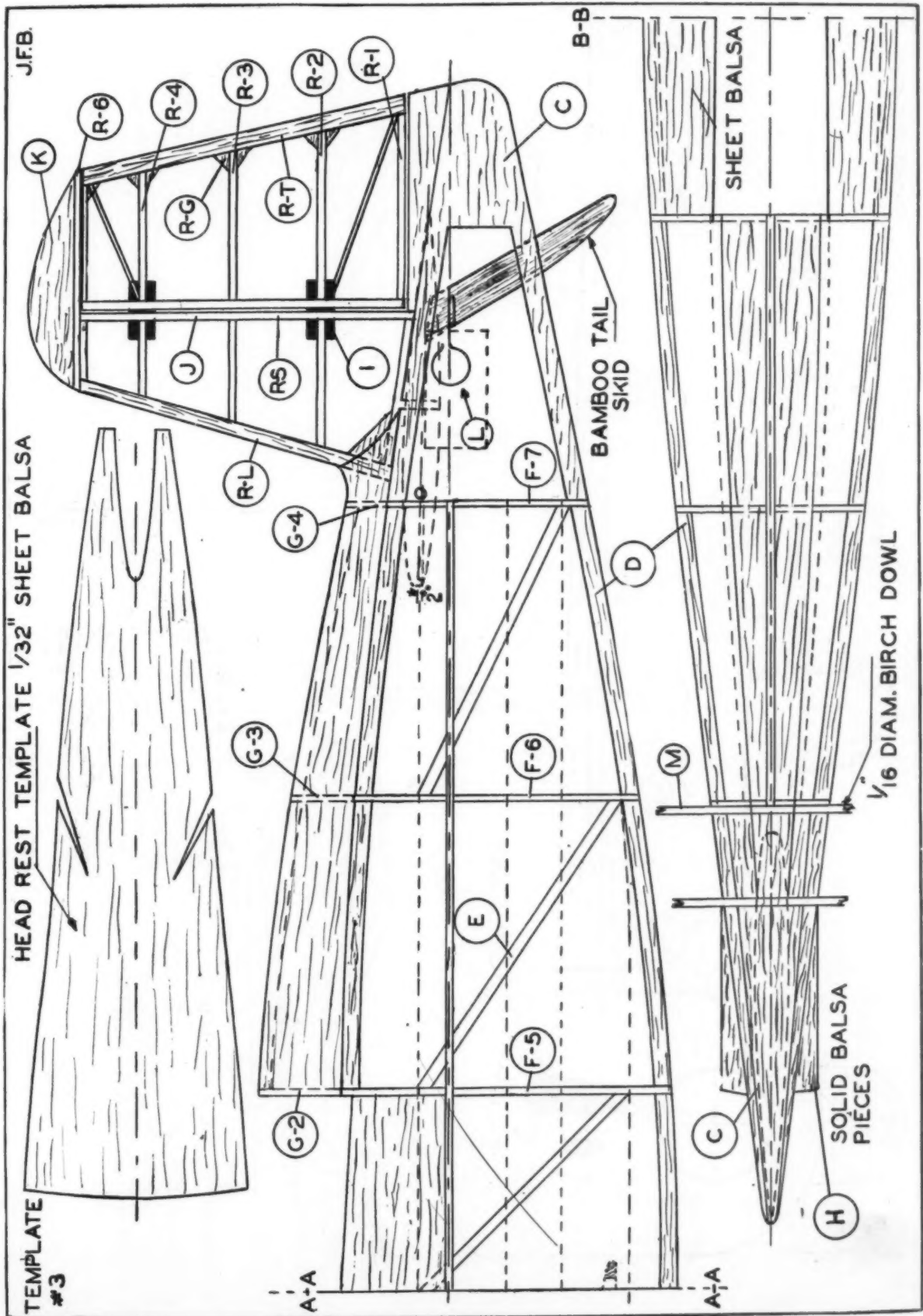
By now the wing panels should be thoroughly dry, so take each one in rotation and sand the tips, leading and trailing edges to the proper shape as shown.

To bring the level of the wing at the rear spar (between ribs No. 5 and No. 8) to that of the aileron, you must cement a 1/16" balsa strip (being 33/32" deep where it meets rib No. 5 and 3/64" deep where it meets No. 8 rib) to each spar at that point on each panel and allow each to dry.

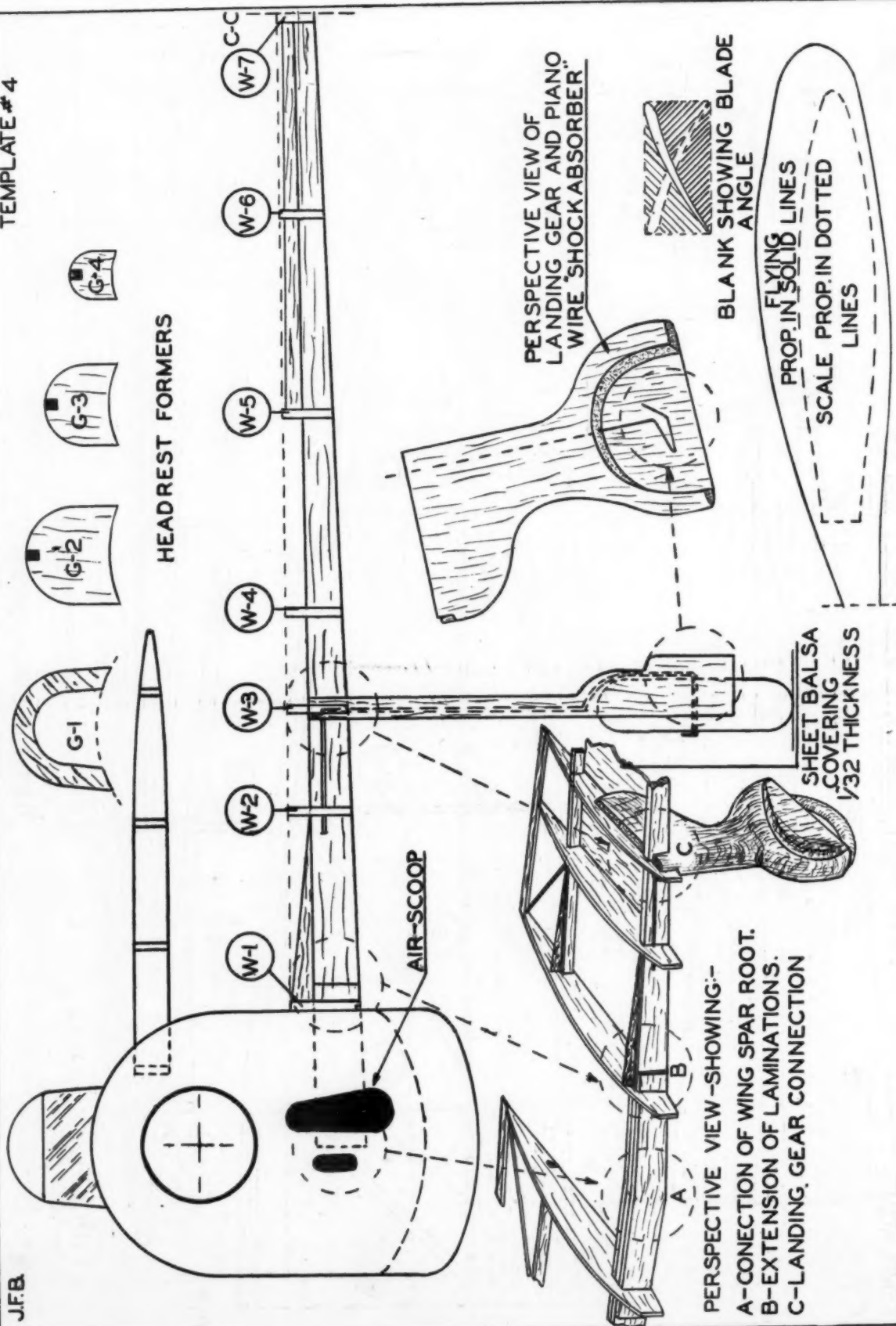
The next step is to join the two halves of the wing at the center. Trace from the front view the correct angle of dihedral and cut two pieces of 1/16" sheet balsa

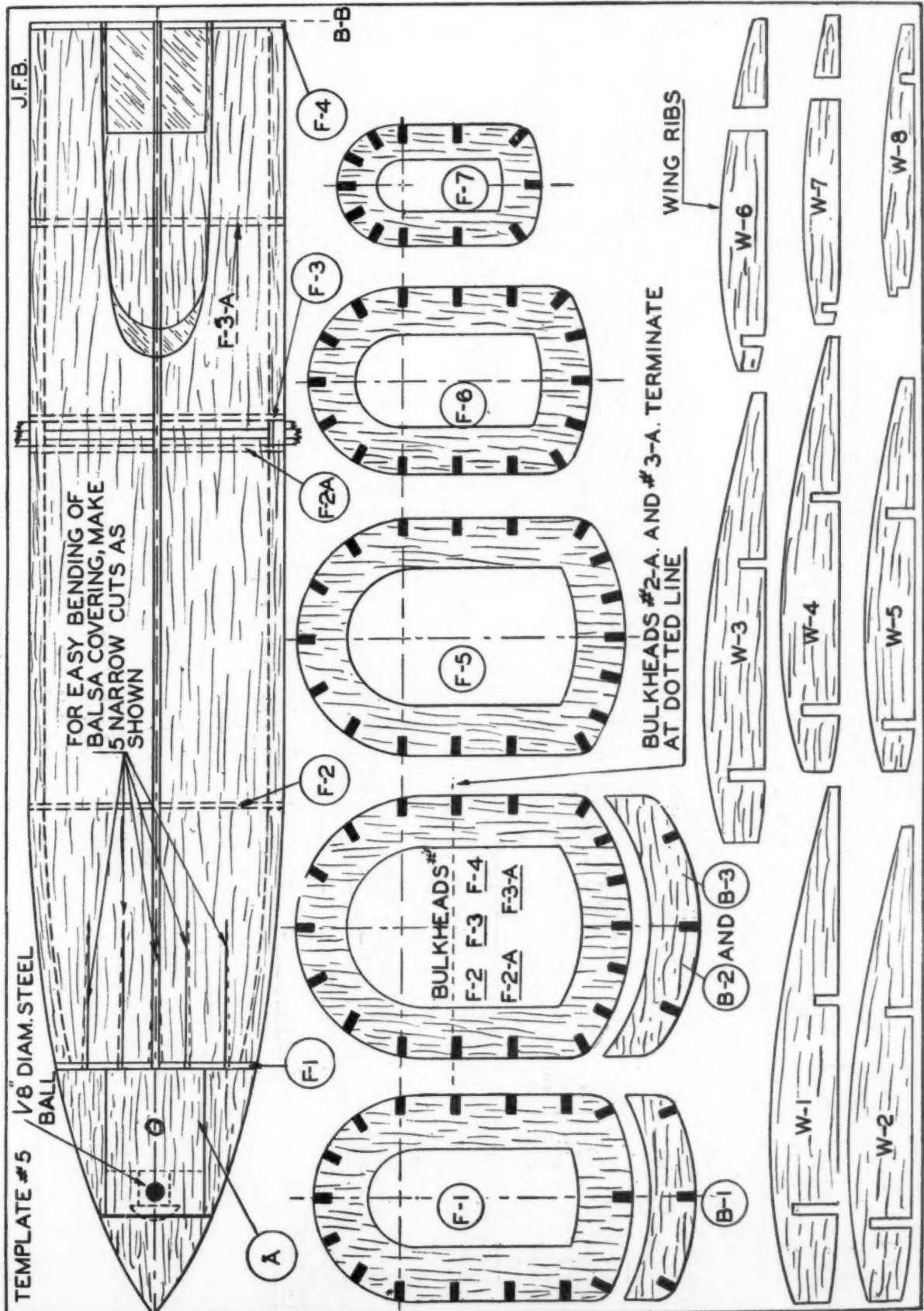
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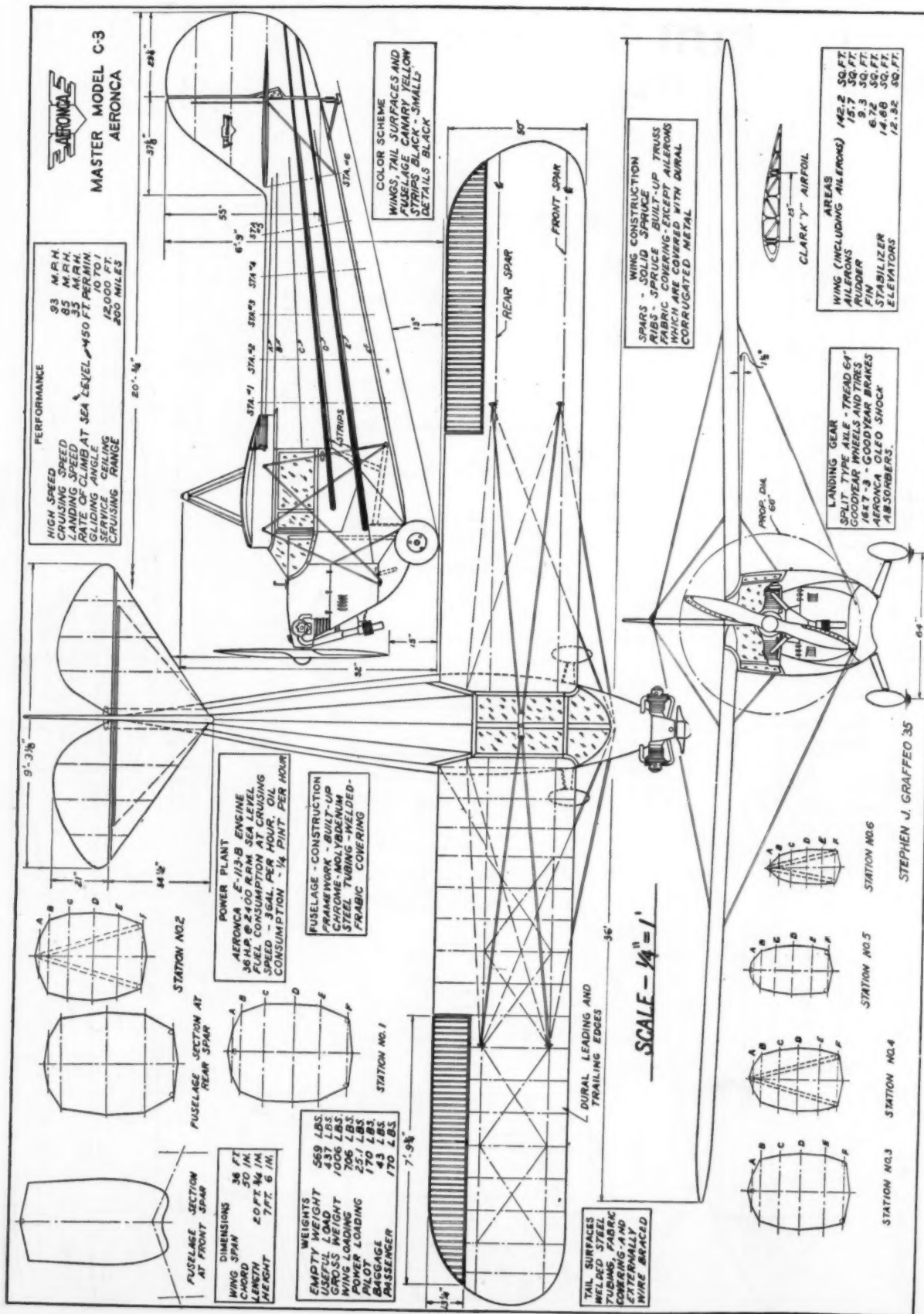




TEMPLATE #4







Important Facts of Rubber Power

Article No. 46

IN THE preceding issue of MODEL AIRPLANE NEWS under the title, "Powering Your Planes to Gain Duration," a summary of important facts concerning rubber motors was given in part. It was not completed due to lack of available space. However, it is continued here for the convenience and ready reference of model builders. Inasmuch as the findings of extensive experiments and analysis are given here in concise sentences, valuable help may be obtained easily without lengthy research. The summary continues:

21. In fine strands $1/30" \times 1/30"$ in cross-section or less, lubrication does not increase the number of turns it is possible to store.

22. The increase in the number of turns possible in a motor due to lubrication ranges from (0) in $1/30" \times 1/30"$ when two strands are used, to 55% increase when eight strands of $1/8" \times 1/30"$ rubber are used. (Lubricated but not stretched.)

23. Stretching the motor to 2.5 times its normal length, when winding it, whether rubber is dry or lubricated, increases the possible number of turns 70%. Multiply hand wound values by (1.7) to determine number of possible turns when stretched.

24. Lubricating rubber has very little effect on the possible maximum torque. When large numbers of strands are used, the motor rubber cross-section remaining the same, the maximum torque increases slightly.

25. The possible maximum torque increases about 60% when the rubber motor is stretched when wound.

26. The amount of work it is possible to store in a brown rubber motor increases about 80% when lubricant is used and motor is wound by hand without stretching.

27. The amount of work that can be stored in black rubber motors increases when a lubricant is used without stretching from 10% in small strand sizes to 50% in large strand sizes.

28. Increasing the number of strands used, with equal motor cross-sections, increases the amount of work that can be stored in lubricated motors. The increase is about 20% when the number of strands used approximates ten or twelve.

29. The torque delivered when the motor is unwinding is from 35% to 50% less than the torque required to wind up the motor. The maximum torque is not effected, however.

30. The work delivered when the motor is unwinding is about 77% of the work required to wind the motor.

31. Dry brown rubber delivers a greater average torque than black rubber.

32. Dry black rubber produces a greater maximum torque than brown rubber.

33. Dry black rubber will absorb and deliver a greater number of turns than dry brown rubber.

34. Dry black rubber will deliver more work than dry brown rubber, except when more than ten strands are used, then brown

Pertinent Facts Concerning the Use of Rubber Motors for Power, Presented in Concise Form for Ready Reference

By CHARLES HAMPSON GRANT

rubber is slightly superior.

35. For equal motor rubber cross-section areas, the greater the number of strands used the less the torque will be for any given number of turns.

36. The greater the number of strands in a motor, the cross section areas being the same, the greater the number of turns it is possible to store in the motor.

37. Square rubber gives more torque and fewer turns than flat rubber.

38. In a motor of a given length, the amount of work that it will deliver is proportional to the cross-section area of the motor regardless of the size or number of strands.

39. Reducing the size of the strands in a motor by one-half but increasing the number of strands in order to give the same motor cross-section area, decreases the torque about 8% and increases the turns 8%.

40. After a dry rubber motor has been wound and unwound repeatedly for six or more times, the torque at any given number of turns is less by 15% to 25%.

41. A dry rubber motor increases from 8% to 10% in length after repeated windings.

42. The average torque delivered by a dry brown rubber motor is about 18% greater than the average torque of a black rubber motor.

43. The greatest possible number of turns that can be stored in a dry black rubber motor is about 18% greater than can be stored in a dry brown rubber motor.

44. Dry brown rubber is about 2% heavier than an equal volume of dry black rubber.

Lubricated Motors (Unstretched)

45. A good rubber lubricant can be made by mixing together thoroughly three parts of liquid green soap and one part of glycerine. The rubber bands should be smeared with this mixture.

46. In motors of eight or more strands brown rubber will deliver a greater maximum torque. In motors of six strands or less the maximum torque is about the same for a given number of strands whether black or brown rubber is used.

47. A greater number of turns may be stored in a motor if black rubber is used.

48. When a motor unwinds, the torque delivered drops more quickly when black rubber is used than in the case of brown rubber, which delivers a greater torque, after the first initial burst of power.

49. Brown rubber motors (lubricated) will deliver more energy (work) than black rubber motors, of equal length, strand size, and number of strands. (Work may be taken as an approximate measure of duration.)

50. Weight for weight brown rubber gives from 10% to 18% more energy than

Chapter No. 4

black rubber, when lubricated.

51. Nine strands of brown rubber delivers the same energy as ten strands of black rubber, when lubricated.

52. Lubricating increases the maximum torque 15% to 20% and increases the possible number of turns 50% to 60% for brown rubber and 30% to 40% for black rubber.

53. The percentage increase of turns and torque is greater when the motor is composed of few strands than when many strands are used.

54. After the first burst of power, the torque during any corresponding period of unwinding is less in lubricated motors than in dry motors.

55. About 25% more work can be stored in lubricated motors than in unlubricated ones.

56. When very small black rubber strands are used, a greater number of turns may be stored in dry rubber, and whether lubricated or not, the work delivered is about the same.

57. A motor of few and small strands should not be lubricated for best results.

58. The use of lubricant decreases fatigue effect from repeated windings especially in the case of brown rubber.

59. When motors are to be lubricated, use brown rubber.

Lubricated Stretched Brown Rubber

60. Stretching lubricated brown rubber when winding produces a maximum torque which is from (1.6) times to (2.0) times the value of the maximum torque produced by dry brown rubber.

61. The fewer the strands in a motor, the less the increase in the maximum torque produced by lubricating and stretching brown rubber motors.

62. Though the maximum torque is increased by stretching the motors when winding, the torque produced as the motor unwinds after the first burst of energy, is about the same as lubricated unstretched brown rubber motors.

63. The number of turns that can be stored in brown rubber motors is increased (2) times to (2.4) times by lubricating and stretching them when winding.

64. 110% to 160% more work can be stored in lubricated stretched brown rubber motors than in dry brown rubber motors.

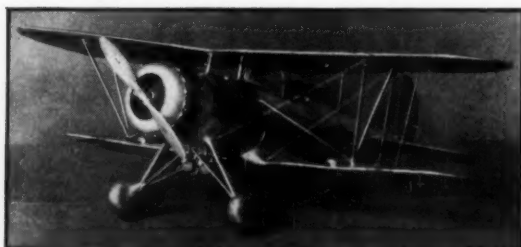
65. The maximum torque is proportional to the size of the strand cross-section times the square root of the strand cross-section area, in lubricated stretched brown rubber motors. It is also proportional to the number of strands times the square root of the number of strands: i.e., it is proportional to $S\sqrt{S}$ or to $N\sqrt{N}$, where (S) equals the strand size and (N) equals the number of strands in a motor.

66. Approximately the number of turns that can be put into a lubricated stretched brown rubber motor is inversely proportional to the square root of the strand

(Continued on page 43)



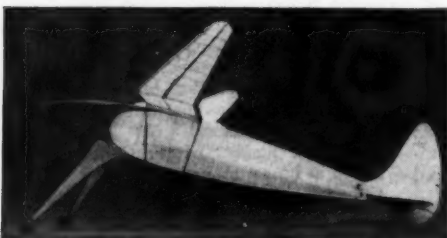
Hawker Day and Night Fighter (Drawing by N. Barker)



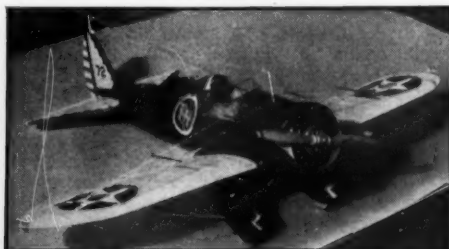
Pict. No. 1. A detail scale model Waco D by E. L. Symms, Jr. It contains 1700 individual parts yet weighs only 4 oz. 1,000 hrs. was required to build it



Pict. No. 5. Don McVicker built this beautiful Boeing 247. The finish is exceptionally fine



Pict. No. 7. A contest model of unusual design and construction by Walter Faryn



Pict. No. 6. Lloyd Weygint of the U.S. Air Forces built this fine detail scale Boeing P26-A

Pict. No. 3. Irwin Ohlsson with trophies he has won and his latest gas job

AIR WAYS HERE AND THERE

What Readers Are Doing to Increase Their Knowledge of Aviation in All Parts of the World. Send Pictures and Details of Your Experiments

IT IS not difficult to note the remarkable advancement in model airplane building among the young men of the world if one will refer to the Air Ways columns in back issues of MODEL AIRPLANE NEWS. Over the past few years there has been a steady improvement in the quality of work turned out by young men interested in this sport. This indicates that in the future there will be unquestionably a great improvement in large machines and aviation in general, for the model builder of today will be the airplane builder of tomorrow. What a wonderful training these builders are obtaining for their future life work! It is one of the few activities in which work is a pleasure. To those who do not believe that building airplanes is a real, enjoyable pastime, we suggest that they try it and see for themselves.

Our first presentation this month is a very clever drawing by Norman Barker of 139 Evans Ave., Toronto, Ontario, Canada, of the Hawker Four-Gun Single-Seat Day-Night

Fighter. This is a picture of one of the outstanding British airplanes. The drawing has an exceedingly professional appearance and we do not hesitate to promise a bright future for Mr. Barker.

A picture of one of the finest models we have ever seen came into this office recently.

It is picture No. 1, showing a Waco D Pursuit, built by Ernest L. Symms, Jr., of 26 Rosewood Ave., Asheville, N.C. This model required 1,000 hours to build and contains 1700 parts. However, it weighs only four ounces; this is the unusual part about it. Most scale models are exceedingly heavy. Without question this model could be flown, if the builder cared to take the chance of demolishing, in a minute, the labor of hours. Some of the details are: wing ribs built up of spruce stringers, detailed cockpit with aluminum seats, safety belts, throttle, aluminum instrument board with instruments, flare release, stick and pedals, radio, machine-guns and bomb releases. The motor is built up with cooling fins, push rods, rocker arms, spark plugs and all electrical wires, magneto and distributor. It even has a carburetor with a gas line to the tank. The controls are movable.

Another unusual piece of work, picture No. 2, has been turned in by Henry Garttmeyer of 46 Fort Washington Ave., New York City. It is a picture of a 12-inch Curtiss Condor bomber made of solid wood. The comparative size of this model may be seen by the ink bottle which appears at the left of the picture near the plane. The

construction of this model is well executed. There are many details, such as model machine-guns in each gunner's compartment. The whole job looks very realistic.



Pict. No. 2. A 12-inch solid scale Curtiss Condor by Henry Garttmeyer. Compare it to the size of the bottle



Pict. No. 8. J. Penny and his "File" glider built to 1½ scale



Pict. No. 14. A group of prominent model builders at the Bamberger Aero Club Model Convention. Left to right, Leo Weiss, Maxwell Bassett, Joe Kovel with his ten-foot world record ship, Gordon Light, Wm. Wert and Charles Heintz, some of the most expert model builders in the world



Pict. No. 15. Jack Smith and his 16-ft. Bowlus Sailplane that flew with remarkable grace at the North Central Ohio Contest



Pict. No. 9. John Duffey and frame of his KG gas job

One of the finest gas model builders in the country is Irwin G. Ohlsson of 1439½ Bellevue Ave., Los Angeles, Calif. Picture No. 3 shows one of his latest gas jobs and some of the trophies which he has won in model plane competitions. Mr. Ohlsson writes, "The outstanding difference in this model is the inverted motor, which to my knowledge is new in models, or at least it opens a new field for designing."

It is interesting to note that Joe Kovel's first gas job had an inverted motor on its first trial. It did not operate as well in this position due to oil filling the plugs. Possibly Mr. Ohlsson will give us a hint as to how this difficulty was overcome in his case. It will be very helpful to many builders. The span of the plane is sixty inches. It weighs two and three-quarters pounds ready to fly. This ship at the California State Fair at Sacramento won the gas event with a flight of one hour, three minutes. This is shading Joe Kovel's time very closely. In fact, Kovel nearly lost his record when Leo Weiss flew his model for one hour, four minutes, twelve seconds, at the 1935 National Competitions. Joe's time is one hour, four minutes, forty seconds. This gas job is not only an excellent flyer, but in appearance is one of the finest produced. The cowl around the engine makes it especially realistic. Perhaps Mr. Ohlsson will tell us how this was made.

Our Air Ways would not be complete without giving an example of structural work in models. Mr. J. G. Wheeler of 966 Bank St., Victoria, British Columbia, has submitted the finest example this month. It takes the form of an uncovered framework of a complete Stinson Reliant detailed model built to a ¾" scale, and is shown in picture No. 4. Wheeler says this model was built from a kit of one

of our prominent advertisers. Both the builder and the manufacturer of the kit are to be commended for the excellent work.

Don McVicker of 252 Pioneer St., Akron, Ohio, gives us a treat by sending us a picture of his solid scale Boeing 247, shown in picture No. 5. The detail of this model is excellent. Even the separate parts of the motors are made accurately to scale. Another unusual feature is the finish. Many model builders have not mastered the art of putting a fine finish on their ships. To do this it is required that the wood be thoroughly sanded and the pores filled. We suggest using a coat of hot glue or wax. The surface should be sanded lightly after the filler is applied. When this is done, several coats of enamel will give an excellent finish. The model measures twenty-four inches in span. It has a completed cabin, landing lights, retractable landing gear. The insignia on the ship is very well done. Many times model builders are not always artists.

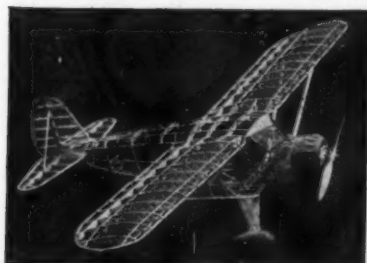
An interesting letter has just been received from Lloyd C. Weygint of VP Squadron 5F, Coco Solo, Canal Zone. He says, "My connection with one of Uncle Sam's patrol squadrons does not satisfy my appetite (Continued on page 46)"



Pict. No. 13. Bill Atwood with his model that won at the Cal. State Model Contest



Pict. No. 10. Junior members of the Nishiki Model Club of Tokyo at a contest. Director, Mr. Minowa



Pict. No. 4. Note the clever detail in this Stinson Reliant by J. Wheeler



Pict. No. 11. Russian school children study aviation by building models. Here are some they have built



Pict. No. 12. Louis Schocke and trophies he won at the California State Model Contest



U. S. ARMY HIGHSPEED MARTIN BOMBER

Claimed fastest service bomber in world. Span 55", length 33 1/2", weight 17 os. Colored standard U. S. Army yellow, olive drab, details black. Novel and strong method of duplicating an almost impossible landing gear (but not retractable). Complicated fillets beautifully (and easily) duplicated. Nothing ever before like it—even our Boeing 247. Turned Balsa invisible hub wheels. By simply removing motor spars (the only time-proven efficient methods of multi-motor powering) model is ready for exhibition. If sold 5 or more years ago, would easily command at least \$20.00. Complete printed-out-wood (Giant) Kit SF-45, postfree. **\$8.50**



TURNER'S WEDELL-WILLIAMS

Another ship needing no introduction since our beloved Col. Roscoe controls it wherever she goes. The '34 Thompson Trophy winner. Fast flying model. Color Wedell-Williams Gold. Has a beautiful "racer" appearance. Has a span of 19 1/2", length 16 1/2". Kit SF-48, postfree. **\$2.95**



TRAVEL AIR MYSTERY
Completely redesigned. Span 23", length 15 1/2", weight 2.2 os. Beautiful solid appearance. Red, black, scalloping, green trim. Kit SF-2 **\$2.95**



HEATH PARASOL
Span 23 1/2", length 12 1/2", weight 0.8 os. Mostly orange, decorative black fuselage side panel. Excellent for beginners, and a "duration" flyer. Kit SF-26 **98c**



GB SUPERSPORTSTER
Doolittle's 1932 Thompson winner—and a beauty. Fast flights. Span 18 1/2", length 13 1/2", weight 2.1 os. White, red scalloping. Kit SF-27 **\$2.50**



BOEING 95 MAIL
Easy for beginners. Redesigned for beauty and even greater duration than ever before. Span 33 1/2", length 24 1/2", weight 3.5 os. Blue and silver. Kit SF-32 **\$2.50**



LOCKHEED VEGA
A picture for beauty—Doolittle's 1932 Thompson winner for flights. Span 30 1/2", length 21", weight 3.7 os. Colored brilliant red & cream. Kit SF-24 **\$3.25**



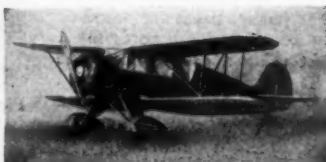
LAIRD SOLUTION
'30 Thompson Trophy Winner. Gold wings and tail surfaces, balance black. Span 15 1/2", length 18 1/2", weight 2.2 os. Kit SF-44 **\$2.50**



COMPER SWIFT
Redesigned. Excellent flights. Span 18", length 13 1/2", weight 1.4 os. Beautiful green, with black fuselage design. Kit SF-33 **\$1.25**



LINCOLN SPORT
A lightplane sensation. Span 19", length 13 1/2", weight 1.5 os. Cream, black trim. Kit SF-36 **98c**



WACO "C" CABIN PLANE

New authentic model of America's keenest cabin biplane. Silver wings and tail surfaces, red fuselage, and landing gear, deftly trimmed in black. Span 24 1/2", length 18 1/2", weight 3.7 os. Very unusual flights. Kit SF-37 **\$3.25**



U. S. ARMY BOEING P12-E

Span 22 1/2", length 15 1/2". Excellent army model. Very popular. Superb. Yellow olive drab with red detailed. Yellow and olive trimmings. Kit SF-38 **\$2.85**



U. S. ARMY BOEING P-28

Span 20 1/2", length 17 1/2". Very popular. Superb. Yellow olive drab with red detailed. Yellow and olive trimmings. Kit SF-39 **\$2.50**

CURTISS F11C-S (GOSHAWK)

The plane which needs no introduction as it has already made an excellent name for itself in Navy work. A fine high-speed flying model. A first prize winner in every contest builders enter it. Colored: the characteristic silver with gray fuselage, green tail surfaces, cowl and other trimmings, and yellow upper wing. Span 23 1/2", length 16 1/2". Kit SF-49 **\$3.75**



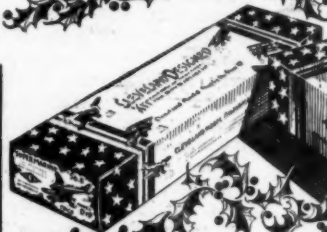
'33 AIR RACE WINNER —WEDELL'S W-WILLIAMS

Span 19 1/2", length 10 1/2". Very beautiful in appearance and flights. Red, black and bronze. Kit SF-47 **\$2.95**



BEAUTIFUL FOKKER D-7 FIGHTER

Span 21 1/2", length 17". Rich in details. Orange, Green, white, black details. Kit SF-15 **\$2.95**



Even the Beautiful New Boxes in which C-D's are now packaged suggest the supreme quality of everything that goes to make up these thoroughbred models—no Christmas wrappings necessary. Silver colored.

And Don't Forget the "Dwarfs"

In addition to the C-D 1/4" models you'll want for Christmas, include a group of these popular little "Dwarfs". They are precisely like those wonderful and famous 1/4" scale C-D's although with a few minor exceptions—very few, in fact—many being simply smaller precise duplicates except "no liquids". Listed here, in addition to the names and prices of the Dwarfs, you will note only the span is given. For length, simply take 1/2 the length of the corresponding design 1/4" scale model and the coloring we suggest is the same as for 1/4" scale models. If you wish to order coloring right with the model, only 1/4 oz. to 1 oz. of each of the two or three main colors, usually listed first, and paper cement and balsa cement will be needed—except double this for D35 and D45 (Liquids 1/2 oz. 6c, 1 oz. 10c, 2 oz. 18c). A 15c package charge when liquids are ordered must be included beyond the 10c packing charge you must send for each Dwarf Kit ordered up to the amount of five. When six or more "Dwarfs" are ordered, no packing charge is necessary, thereby saving you 60c or more.

EVERY 1/4" C-D KIT CONTAINS

1. Pilot block for carving, with instructions. 2. Coloring for pilots. 3. Coloring for propellers, whether metal or wood. 4. Black for all details. 5. Thread for all bracewires (mostly new silver grey). 6. Printed out wood, not a few places rubber stamped, but every necessary curved piece printed out clearly on the finest grade of balsa wood obtainable. 7. All strip wood necessary. 8. Sufficient dope for the model, cement for gluing it together and tissue cement for applying the paper and coating. 9. Complete material for scale propeller as well as that for flying propeller. 10. Authentic rib and stringer material supplied new in all kits (many fitted-in fuselage jobs, too). 11. And, of course, all necessary insignia, color striping with tape, special new shaped wood blocks, etc., etc., where needed.

CLEVELAND MODEL

1866NM West 57th St.,

★ ★ ★ ★ ★



**BOEING 247 HIGHSPEED TRANSPORT**

This giant has a span of 55' and a length of 38' 1/2", and is nothing less than a wizard for flights, with its two motors powerfully pulling. It is entirely gray colored and weighs 16 oz. The redesigned model has all curved wood printed-out (an enormous quantity) with data for more authentic building and appearance than heretofore, with "filled-in" fuselage, balanced controls, etc. The thoroughly engineered drawing of four large panels (17" x 44"), each contains accurate modeling information and over 16 oz. of liquids, dope, cement, etc., contained within each one of the new giant. Kits. Kit SF-35, postfree.....

\$8.50**GREAT LAKES SPORT TRAINER**

One of the prettiest models available. Far easier to build than our older No. SF-1E and SF-1F. Excellent flights. Includes Cleveland's latest features and loads of details. Span 30", length 15 1/2", weight 2.1 oz. Orange and cream. Kit SF-1

\$2.65**Christmas if you get C-D's!**

away as a gift. Get them now—then check off the ones you want Mother, Dad, your wife or relatives to give you for Christmas. Prices are so reasonable, too, for such exceptional values. And you know beforehand that you'll never be disappointed with a Cleveland Kit—our 16 years sincere devotion to designing and building the finest flying models possible is your guarantee of that. If your dealer hasn't yet put in a complete line of C-D's, urge him to do so now. He'll sell lots of 'em, and it will make it easy and convenient for you to get the models you want—when you want them.

CURTISS ARMY HAWK P6E

We claim for this model the distinction of being the finest and most complete authentic flying model on the market today—and she flies very well, too! Colored the usual yellow and olive-drab of the Army with the beautiful color marking of the Selfridge Field Squadron of its characteristic black and white; with black lettering and red striped top wing, along with the red, white and blue insignia. The model should make a 100% wind tunnel model. Every possible detail, wing ribs, stringers, etc., reproduced. Span 23 1/2", length 15 1/2", weight 4.9 oz. Complete Kit SF-21.....

\$3.25**DOUGLAS O-38 OBSERVATION**

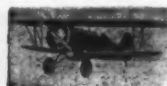
Span 30 1/2", length 22 1/2". Very beautiful, and unusually well detailed. Yellow, olive drab, black details. Kit SF-43

\$3.75**VOUGHT CORSAIR V-65**

Super detailed, extremely realistic. Embodies latest Cleveland features, including scale rib spacing, "full" motor, etc. Really fine flights. Span 27", length 19 1/2". Suggested coloring: blue, yellow, red, black and silver. Kit SF-41

\$3.75**4-WHEELED HOWARD RACER "IKE"**

Span 15 1/2", length 13 1/2". Flies and climbs beautifully. Also data for "Mike". White, black details. Kit SF-42

98c**U.S. NAVY BOEING F4B3 (or 4)**

Span 23 1/2", length 15 1/2". Exciting to build—thrilling to fly. Silver, yellow, and red. Kit SF-29

\$2.85**DAYLE'S GEE-BEE**

1931 Air Race champion. Span 17 1/2", length 12", weight 3.1 oz. Yellow and black. Kit SF-17

\$1.95**A-W QUAD FIGHTER**

Very unusual steady wartime flyer. Easy to build. Span 20 1/2", length 18 1/2", weight 2.3 oz. Red, white and blue. Kit SF-11

\$2.50**SUPERMARINE S.B.5**

Greatly improved model of this Schneider Trophy winner, which will R.O.W. Span 22 1/2", length over all 21 1/2", weight 3.2 oz. Silver and blue. Kit SF-19

\$2.50**FOKKER TRIPLANE**

Plane of Germany's greatest ace, Von Richthofen. Span 17 1/2", length 14 1/2", weight 2.3 oz. New authentically colored silver nose, white rudder and markings. Kit SF-11

\$2.50**HAWKER HIGHSPEED FURY FIGHTER**

Span 22 1/2", length 19 1/2". Redesignated. Long fast flights. All silver with light blue markings. Kit SF-20

\$2.65**MONOCOUPÉ**

Span 24", length 15 1/2", weight 2.4 oz. Beautifully colored cream and orange. This design has won many first prizes for model-builders. Kit SF-28

\$2.50**AERONA C-3 SPORTPLANE**

Span 27", length 15 1/2". An easy to build Air Race model—fine flights for beginners to build. Red and silver. Black details. Kit SF-40

\$2.65**HOWARD "PETE"**

Span 15", length 13 1/2". An easy to build Air Race model—fine flights for beginners to build. Red and silver. Black details. Kit SF-18

\$1.35**The Complete Line of Dwarf Models**

SINCE 1/2" and 3/8" SCALE C-D KITS BUILD UP PRECISELY THE SAME BEAUTIFUL MODELS SIMPLY REFER TO ILLUSTRATIONS UNDER CORRESPONDING NUMBERS. (D's are dry kits.)

When ordering please remember these are "Dry" kits (no liquids included.)

No.	Name	Span	Price	No.	Name	Span	Price
D-1	Gr. L. Sport Trainer...	13 3/8"	\$.65	D-28	Monocoupe Sportplane...	16	\$.45
D-2	Tr. Air. Mystery Ship...	14 1/2"	.50	D-29	Boeing F4B-3 Fight...	15	.45
D-3	Tr. Air. Mystery Ship...	14 1/2"	.50	D-30	Boeing 95 Mailplane...	22 1/4"	.85
D-4	Army Boeing F12-E...	15	.65	D-31	Comper Swift Lightpl...	13	.30
D-11	A-W Quad Fighter...	14	.45	D-32	Boeing 247 Transport...	38 7/8"	2.50
D-14	Fokker Triplane...	11 3/4"	.45	D-36	Lincoln Sportplane...	10	.25
D-15	Fokker D-7 Fighter...	14 1/8"	.60	D-37	Waco C Cabinplane...	16 1/2"	.75
D-17	Dayle's 21 Gee-Bee...	11 3/8"	.50	D-40	Aerona C-3 Sport...	18	.65
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Aviation Advisory Board

Conducted by
CHARLES HAMPSON GRANT
Chairman of the Board

Formerly of
The Technical Section, Air Service, U.S. Army

IT IS not difficult to determine the general trend of thought among model builders from questions received in the Advisory Board Department. A little while ago the majority of questions concerned types of planes, makes, who flew them, as well as a great many questions about war planes. We find now, however, that model builders are giving airplane design more serious consideration. They appear to want to know how to build models that will fly properly. Greater interest is being shown in wing characteristics and problems of stability. This indicates that young men are taking up model building with a more serious purpose in mind. It is to be commended.

Here are a few questions and their answers which we have received recently:

Wes Ringius of 794 Mound St., St. Paul, Minn., has built a Douglas Observation Y10-43 with a 22-inch wingspread and he has been having great difficulty in preventing it from stalling at the beginning of a flight. He wants to know what causes this condition.

Ringius has told us very little about his ship, saying only that it stalls at the beginning of a flight. He does not state whether or not during the rest of the flight the machine performs in a normal manner or whether it glides satisfactorily. We assume, therefore, that it does.

Under these conditions the cause of stalling at the beginning of a flight is usually due to too great an angle between the wing chord and the stabilizer chord. The way to correct this is to raise the front edge of the stabilizer, giving it a greater positive angle of incidence. We suggest that Ringius raise it 1/32" at a time, trying out the model between each new set-up to determine whether or not the ship performs properly. When the proper setting is determined it may be that the ship will be nose-heavy while gliding. If this is the case, weight the tail slightly and readjust the stabilizer until the flight of the model is perfect.

Question: Has the wing area anything to do with this condition?

Answer: Absolutely not. The only way that the wing area would have a bearing on this matter is in regard to the proportion of the stabilizer area to the wing area. Too small a stabilizer area relative to the wing area would cause erratic and possibly stalling flights.

Question: What are the high speeds of the Boeing P12-E, P12-F and the F4B-4?

Answer: The high speed of the P12-E

is about 185 miles per hour. The P12-F does over 200 miles per hour, as does the F4B-4.

Question: What is the purpose of scalloped wings?

Answer: There is no definite advantage, but is merely the form of construction chosen by the designer. In such a type of wing the thickness of the trailing edge is reduced to a minimum; possibly because of this a very slight reduction in drag might take place. Scallops on a wing are produced by the use of a wire along the rear tips of the ribs, instead of a stiff piece of metal or wood.

Richard G. Fuller of Route 1, Box 44, Aromas, Calif., is evidently interested in tailless airplanes, for he asks:

Question: Where is the center of gravity placed on a tailless plane in relation to the normal center of pressure of the wing?

Answer: The center of gravity is placed slightly ahead of the normal center of pressure of the wing, the same as in other airplanes. The only difference between a normal airplane and a tailless airplane, in regard to the tail effect, is that the tail effect is accomplished by a negative angle of incidence at the wing tips which is used in combination with a sweepback on the wing, and which acts the same as a negative angle on the tail. In effect, you have two small surfaces at the end of the wing which give you the effect of two tails. The wing having a sweepback they are to the rear of the center of gravity. The down pressure on this balances the down pull of the center of gravity forward of the center

of lift. The speed of the airplane changes the values of the tail pressure so that this, acting in conjunction with the constant values of the center of gravity and lift, make the airplane nose upward or downward.

Question: How large should the rudders be?

Answer: This is rather a difficult question, inasmuch as every airplane should have different size rudders, depending upon its design. We suggest that you make the total combined areas of the rudders equal to the area of the vertical surfaces of an ordinary airplane.

Question: How much sweepback do you use?

Answer: You should use at least thirty degrees on each wing.

Question: Does it need sweepback?

Answer: Yes, unless some other method is used to dispose the negative wing tips considerably to the rear of the center of gravity.

Question: How can you remove dope and ambroid from your hands and from brushes after it has dried?

Answer: The hands or brushes should be soaked in amyl acetate or acetone. This will dissolve the ambroid.

Leon F. Kubinski of 859 East Church Street, Elmira, N.Y., wishes to know:

Question: What characteristics determine the design of a wing section expressly for soaring?

Answer: Such a wing section is usually of medium camber height. That is, the

(Continued on page 28)



One of the giant short 5580 hp. flying boats R.6/28. It is driven by six Rolls Royce Buzzard Engines. (Courtesy Imperial Airways)

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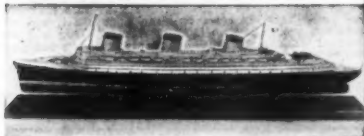
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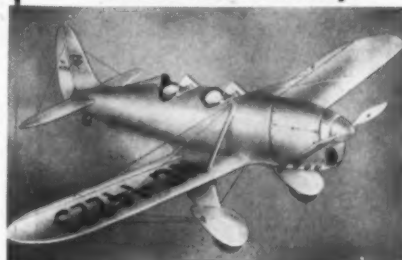
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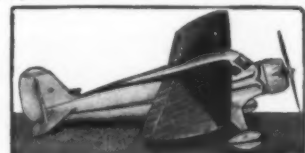
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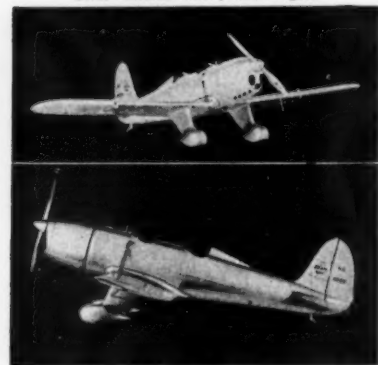


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camber is about $\frac{1}{8}$ to $\frac{1}{9}$ the chord length; camber being the height of the arch of the upper surface from the chord line. Such wing sections usually have a rounded leading edge and a slight concavity on the undersurface toward the trailing edge. It should be a section which has a high lift to drag ratio and yet, which has a high lift. A slightly concave undersurface at the rear makes the lift coefficient fairly large, while if the streamline effect of the section is kept, the L/D will be very good. The undersurface near the leading edge should sweep downward slightly from the nose and sweep backward to form a concavity near the trailing edge. This concavity should be disposed from the trailing edge forward for about $\frac{1}{2}$ to $\frac{3}{4}$ the chord length. Many of the latest N.A.C.A. sections would be suitable.

Build and Fly This Famous Racer

(Continued from page 15)

to the shape of the front spar between both No. 1 ribs, extending $\frac{3}{16}$ " beyond each rib. Make two pieces this shape to act as re-inforcements for the spar roots.

Hold the wing at the proper dihedral angle by placing a block under each wing tip and cement these pieces to the center section of the wing on either side of the spars. Drive pins through them to hold them together and allow to dry.

There is no connection between the rear spar for practically all of the flying and landing stress is sustained by the front spar, so the wing is now finished. Now sand the ailerons as you did the wing and when through put them away until needed.

The Tail

Take out the elevator rib templates and trace them on $\frac{1}{16}$ " sheet balsa stock. Make two of each, a front and rear half for all but No. 5 as shown on Plate No. 1;—front and rear halves for each rib, after which you drill a hole in each one to accommodate the front stabilizer spar. Cut a balsa strip $\frac{1}{16}$ " \times $\frac{3}{4}$ " \times $\frac{3}{4}$ " for the rear spar of the stabilizer and $\frac{1}{16}$ " \times $\frac{1}{4}$ " \times $\frac{3}{4}$ " for each half of the elevators. You will notice that the front spar of the stabilizer is made of $\frac{1}{16}$ " diameter birch dowel. Cut this spar also to its proper length.

Now cement the rear halves of ribs to each elevator spar and stand them with the spars facing flat on the board and the ribs upright. Force the $\frac{1}{16}$ " dowel spar through the holes in the stabilizer and after lining them up on the drawing, cement them in place. Cement the rear stabilizer spar in place and stand it up similar to the elevators. When the elevators have dried sufficiently, cut two pieces of $\frac{3}{8}$ " \times $\frac{1}{16}$ " balsa for the trailing edges and cement them on.

While these dry, trace and cut the tail tips and by the time this is done, the stabilizer should be ready for the leading edges. Cut these from $\frac{3}{32}$ " \times $\frac{5}{32}$ " strips and cement them on. Then go back to the elevators and cement in the gussets and bamboo strips.

When the stabilizer is dry, cement rib No. 5 in place on each end and when these are dry, attach the other tips. Allow these to become solid, then sand the lead-

ing and trailing edges and all else to the proper shape. Then cut and cement in all the aluminum hinges as shown. To make the rudder, repeat the above process.

The Fuselage

Take out all the fuselage bulkhead templates and those for the underslung radiator and headrest.

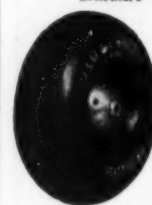
Trace these on $\frac{1}{16}$ " sheet stock, cut out each one and notch them. Cut several strips of $\frac{1}{16}$ " \times $\frac{3}{8}$ " for stringers and choose 4 of the strongest for the longerons. Then lay each one on the drawings and mark off the bulkhead stations on them.

Now cement the front end of the top and bottom longeron to former No. 1. Allow these to dry, then cement formers Nos. 2-3-4 in place and allow these to dry also. Fasten the two side longerons in place and when these are thoroughly dry, slip in and cement all the other bulkheads. In placing in the other stringers,

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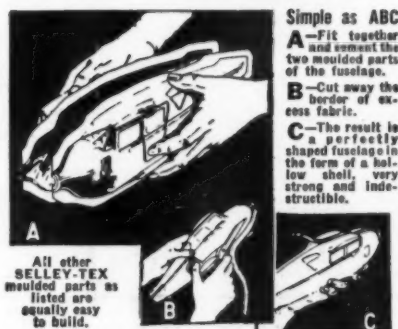
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you should be careful to keep the bulkheads perfectly lined throughout. To do this the first three stringers on the top, bottom, and both sides, should be cemented in place and allowed to dry. When this has been accomplished, the remaining stringers can be put in. Cut several pieces of $3/32 \times 1/16$ " to form the cross members of the fuselage marked "E" and cement each in place as shown in side view.

Tail and Nose Blocks

The nose portion of the fuselage is made in three pieces, namely, the center piece which is hollow as shown in side view of fuselage and the two side outer pieces which are solid. Trace and cut each one out. Then cement them together, holding them with pins. While this dries, make the fuselage tail end block.

In making this part you repeat the previous procedure of making the nose with exception of shape. After making the three pieces, cement them together and pin the sides down. Now take the nose piece and pressing it against bulkhead No. 1, trace the outline of the latter on it. Then curve and sand it to the proper shape, after which you cement it in place.

By now the tail block should be dry, so place the front end of it against bulkhead No. 7 and trace the shape of the latter on it. Now curve and sand it down and cement it on.

The radiator is next. The formers for this should have been made along with those of the fuselage and headrest. If they are finished, all you have to do is to cut 3 strips of $1/16 \times 3/8 \times 3 \text{ 9/16}$ " and after marking the bulkhead stations on them, cement them to the formers. When this is dry, cement each former to the bottom of fuselage as shown in side view.

Now take the $1/32$ " sheet to form the covering for the top of the fuselage and the radiator and cement each in place holding each down with small rubber bands or pins. You will note on the top view of the fuselage at the front end that there are shown in dotted and solid lines, five narrow slits. These are made to allow easier curving of the fuselage covering. Make these cuts as shown before applying the sheet stock to the model.

Now cement the headrest formers in place, cut a piece of $1/16 \times 3/8$ " strip to fit the length between formers Nos. 2 and 4 and cement it in place. While this dries make the headrest $1/32$ " sheet covering as shown. Then cement it in place holding it down with pins.

Cut out the cockpit and sand down all the sheet covering smoothly.

The Wind Screen

This part of construction can be made to either slide back over the cockpit or remain permanently in either open or closed position. It is made of $1/16$ " square balsa strips and a solid piece for the dome. The rear bulkhead is shown in the front view drawings and is marked "G-1." Build it as shown, but do not fasten it on until after covering the model.

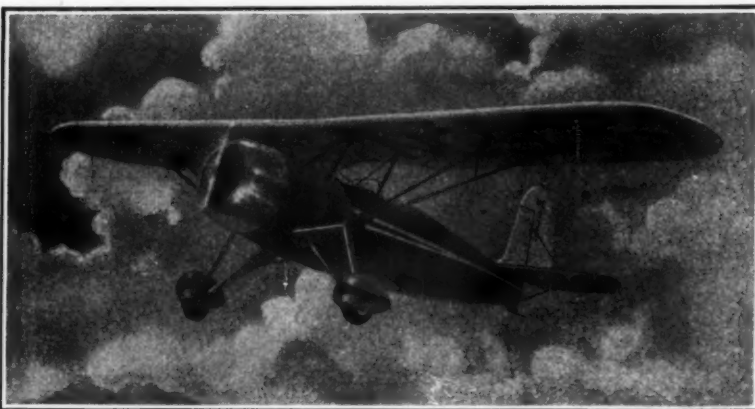
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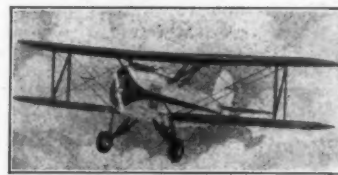
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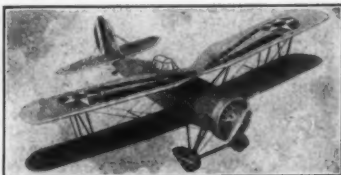
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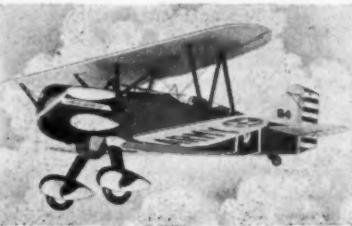
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piece of either hardwood or balsa. Trace each one from the template and carve them to the proper shape, as shown in front, side, and perspective views. Carve out the side facing inward to accommodate the wheels and "piano-wire" axle. This done, make a 1/16" slot along the top of each from front to rear to slide over No. 3 rib. Then drill or burn a hole the diameter of the piano wire from top to bottom so as to insert the shock absorber wire. Bend the wire of gauge .013 to the shape shown in front, side, and perspective views and insert it in place. Slide a hardwood wheel on each wire and bend the ends upward.

The next thing is the tail skid and rear rubber hook. First, bend the hook with sufficient extra length. Then make the skid of 3/4"x1/16" bamboo. When this is shaped, bend the straight end of the wire around it at the point shown in side view. Cut a slot in the bottom of the tail block and force the skid and hook in place.

In the side view of the tail block is shown a rectangular opening on the left side of the fuselage to allow insertion of rubber. Cut out this portion of the tail block and through this pour the cement onto the upper end of the tail skid. Now drill a 1/4" hole in the nose of the ship to fit the nose plug and cut a shallow trough 3/4" diameter for the mushroom head of the plug to fit in. The propeller spinner and the plug can be bought ready made or spun on a lathe, preferably of hardwood. The propeller should also be of hardwood to keep as much weight as possible up front.

Drawings for two different types of propellers are shown in plate No. 4. The one in solid lines is for flying and the one in dotted lines is for scale use. The flying propeller should be carved from one full-size double-ended block and not in two halves, but the scale propeller can be made either way. After carving the flying propeller, make a slot in the spinner and insert the blade. Cement it on after truing them up with the propeller shaft, bend the front end of the shaft upwards on the front of the spinner and cement the wire to it as shown (side view) in dotted lines. Slip the other end through the nose plug and bend a hook on it.

Covering the Model

The color of the large ship is all blue with white lettering, although on the model it can be any color desired.

In covering the model, it is best to have the grain of the paper running lengthwise. Lay all the parts on the Japanese tissue sheet and trace with a colored pencil around the border of each part to be covered. After all the parts have been traced, cut them out and start covering. When the covering has been done, spray it lightly with water and allow it to dry. This shrinks the paper, giving a smooth, even covering. Then dope it with a light coat of banana oil.

Assembling

To assemble the model, slip the front spar of the wing in the opening between bulkheads No. 2-A and No. 3. After

(Continued on page 48)



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A Fine Flyer That's Easily Made

(Continued from page 10)

bly consists of a 1/8x1/8 balsa strip cut to length. The three parts are cemented together and when dry are cemented in place on the wing. Whereas this is a simple-to-make wing mounting structure, it is very rugged and when slipped on the motor stick, will accurately set the wing at the proper angle of incidence.

Tail Unit

The fin is made of 1/32" lightweight sheet balsa and is cemented onto the left side of the motor stick as shown.

The stabilizer is made in the same general manner as described for the wing. The front and trailing edge spars are sanded to the shape similar to the wing. Cover it on top with tissue. In the exact center on top of each spar, trim off a small square of tissue where the spar will be cemented to the underside of the motor stick. To cement the two together, lay the stabilizer flat on the drawing board. The motor stick is then put in its proper place and held there by weights until the cement is dry. Apply several coats.

Miscellaneous

The "Can" is made of soft wire, about .020" size and the circular part is 1/4" in diameter. The hook "K" for holding the wing anchor band is of the same material. However, music wire could be used in either case but is harder to work.

The landing gear is made of a straight length of .028" music wire. Put the wheels on and bend the wire at right angles to form a hub cap, see figures 1 and 9. Now put in the bamboo spreader bar, cement and bind with thread. Use thread and cement in securing the landing gear to the motor stick. Attach the thrust bearing with thread and cement.

A 7" machine-cut balsa propeller is advised as a little sanding will prepare it for use and it can be bought for a small sum from any of the supply houses. However, anyone desiring to carve the propeller from a block may do so. If so, use a block 9/16x1x7" cut to the "X" type of blank.

A propeller shaft can be used for the rear hook "H" or one can be bent from .028" music wire. A tiny hole is made straight through the motor stick, 2 1/2" from the rear end and the straight part of the wire hook is inserted. It is then bent straight back along the stick and cut off; see fig. 9. Also note that the motor stick is tapered from where the stabilizer begins to 1/16" wide at the rear tip (1/16" in a length of 2 1/2"; it is tapered on one side only).

The wing is anchored by means of a small rubber band. This is done by looping the band around the motor stick just ahead of the wing. It is then stretched rearwardly under the wing and hooked on each side of the wire part "K."

Three loops (6 strands) of 1/16x1/30" rubber thread are needed for the motive power. The rubber is looped around the prop shaft and rear hook and the ends tied together at the rear.

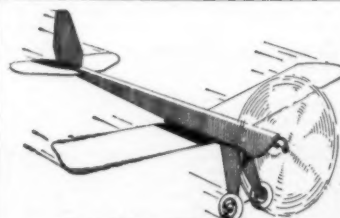
When the model is entirely assembled,

try gliding it. Move the wing forward if it tends to dive and backward if it noses up, until the best glide is obtained. The technique of pre-flight test gliding a model is: release the plane in its natural gliding angle and at approximately its gliding speed, with the wing tips laterally level. Thus it will start on its glide with balance rather than in an unbalanced attitude. You should acquire this skill with a little practice. Select as calm weather as possible.

Now wind the motor up for a test flight. If it does not fly correctly, recheck and readjust it. Correct any error which you have made. If you have done a careful job, you will probably experience little or no difficulty in flying it, even though just having begun the "game."

Please remember this, that not just one in every few, but EACH model accurately built according to these plans will be a consistent and dependable flyer.

After finishing your adjustments, you may lubricate the motor and wind it to capacity with a winder, to see it climb up and away to give you thrills, aplenty!



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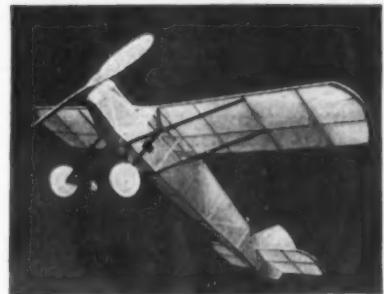
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Highlights of Progress in Indoor Design

(Continued from page 9)

In 1929 Joseph Culver won the Stout indoor trophy with a model that did not resemble any of his predecessors. His wing had a curved dihedral and was very stable. Culver claimed that the performance shown by this wing was good enough to compensate for the loss of lift due to the large amount of dihedral. The motor stick of Culver's model was built up as usual, and the elevator was kite-shaped but was more effective for the reason that it was set back farther from the center of gravity of his model.

The year 1930 might be termed the first transition period in the development of indoor model airplane design, for it was in this year that a number of radical changes were made. All lifting surfaces were lightened through the use of superfine tissue, verithin tissue and aluminum leaf. The wings of many of the models were mounted above the fuselage and greater stability was thus effected. By placing the rubber motor below the motor stick, a lower center of gravity was secured. Longitudinal stability was further increased by mounting the elevator away from the center of gravity on a boom. Both hollow and solid booms were used, but the former were to be preferred because of their greater rigidity and lighter weight. The use of a tail boom in combination with a large area elevator was responsible for the abandonment of the inverse camber design. A variety of propeller shapes was also exhibited. Some builders including Ray Thompson and Fay Stroud, used blades with rounded tips, while others used long, elliptically shaped blades. Albert Mott and Ernest McCoy used propellers with most of the blade area concentrated near the center of the blade. Such props were known as "butter paddles" and turned over very slowly. Ray Thompson's prop was swept back, but it is doubtful whether this had any helpful effect on the performance of his model. What reason he had for this design is not known to the author.

The durations attained at this time were made with ships having wing areas of from seventy to one hundred square inches. The rules for the tractor event specified only that the distance between the thrust bearing and the rear hook be fifteen inches. Obviously the one using the largest wing area in combination with a low wing loading had the advantage—at least present-day records for the various classes of wing areas seem to indicate this. Before the rules were standardized, records were broken with regularity, and probably because larger wing areas were employed. Even since this standardization of rules by the N.A.A. took place, indoor records have been bettered each year, but this is due only to the development of better designs.

During the year of 1931 a number of excellent indoor flights were made, but there was no indoor event held that year at the Nationals in Dayton, Ohio, as there was no arena in that city large enough for the purpose intended.

Just about this time, an article by Jerome Kittel of Englewood, N.J., ap-

peared in MODEL AIRPLANE NEWS. This article served to announce a new covering for indoor models—microfilm. Kittel appeared at a number of local indoor meets with a tractor whose wing and tail surfaces were covered with this new material. He claimed that the ship had done over ten minutes, but he also expressed doubt that microfilm was practical. At Atlantic City, the scene of the 1932 national meet, three microfilm-covered models, one of which belonged to the author, were entered. Neither of the three models placed high up in the list of the winners, but nevertheless these models did stir up a considerable amount of interest among those builders who were present at the contest.

Indoor model builders spent much of their time for the rest of the year in experimenting with this new covering, but only a few builders showed up at indoor meets with microfilm-covered models. It remained for Herbert Owen of New Britain, Conn., to make model airplane history when he broke the existing R.O.G. record of some five and one-half minutes with a flight of 7:29 minutes. Needless to say, everybody built microfilm ships after that. In fact paper-covered models were as rare as the proverbial day in June.

When the national contest was held in 1933 in New York City, very few paper-covered ships were entered—the builders

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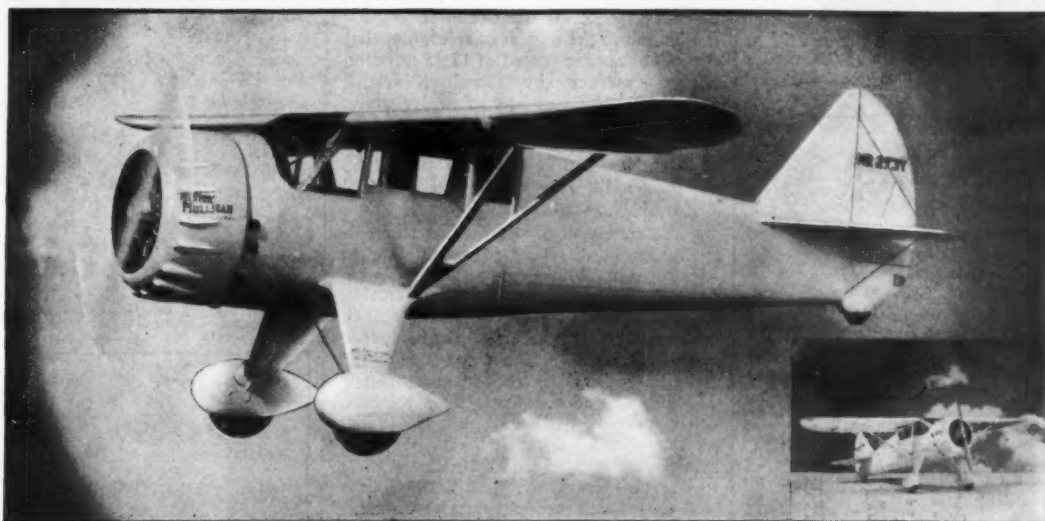


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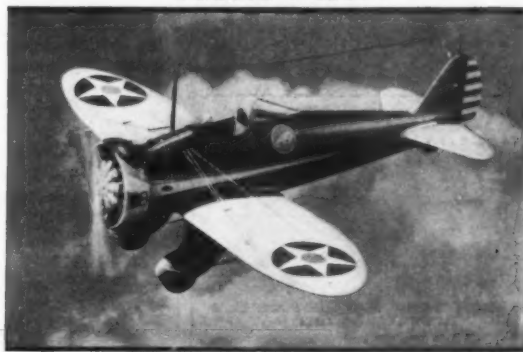
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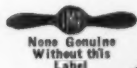
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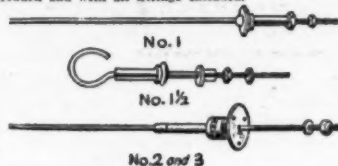
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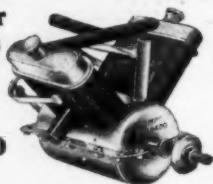


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knew that they would thus be seriously handicapped. This year 1931-1932 might be called the second transition period, for it was due to the advent of microfilm that the indoor tractor record of 13:13 minutes, which was held by Joseph Kovel of Brooklyn, N.Y., was broken twelve times. John Bartol won the meet with an unheard-of time of 17 minutes, 47 seconds. Carl Goldberg of New York pepped up the meet a little by making an unofficial flight of 19:34 minutes.

The depression hasn't seemed to affect the progress of model plane building to any great extent, for records are being broken with increased regularity. During 1932, new marks were made in the R.O.G. and tractor events and also in the indoor commercial event which was added to the indoor program of the national meets. Models came to outwardly resemble each other instead of differing in appearances as they did in 1930. Elliptically-shaped wings and tail surfaces became almost universal. Everybody used hollow sticks and booms and seemed to prefer the teardrop design of Carl Goldberg. Such a stick may be made to weigh less than half as much as the built-up, rectangular cross-section type developed by Aram Abgarian in 1928.

The 1934 National Model Airplane Championships were held in Akron, Ohio, and one of the finest structures for indoor flying was secured. The Goodyear-Zepelin air-dock is 185 feet high inside—high enough for any record to be made in. The indoor mark, naturally, was raised from 17:47 to 19:04 minutes, and Carl Goldberg again showed his ability by making an all-time world's record of 22:59 minutes. The indoor commercial duration was raised from 8:56 to 13:24 minutes. At this meet were to be seen elliptically-shaped wings containing polyhedral rather than dihedral angle. These wings were mounted off motor sticks at greater distances than ever before. Ships were also lighter and stronger in construction but these were the only noticeable changes from the previous year's typical indoor tractor design. John Young of New York made a noteworthy improvement on the indoor commercial when he braced his fuselage with superfine tissue and covered the sides with microfilm. A class B commercial with a fuselage of

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STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF MARCH 3, 1933

Of MODEL AIRPLANE NEWS published monthly at Mount Morris, Ill., for October 1st, 1935, State of New York, County of New York.

Before me, a Notary Public in and for the State and County aforesaid, personally appeared George C. Johnson, who, having been duly sworn according to law, deposes and says that he is the Publisher of MODEL AIRPLANE NEWS and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of March 3, 1933, embodied in Section 411, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are:

Publisher, George C. Johnson, 551 Fifth Avenue, New York, N.Y. Editor, Charles H. Grant, 551 Fifth Avenue, New York, N.Y. Managing Editor, George C. Johnson, 551 Fifth Avenue, New York, N.Y. Business Manager, George C. Johnson, 551 Fifth Avenue, New York, N.Y.

2. That the owner is: Jay Publishing Corp., 551 Fifth Avenue, New York, N.Y. George C. Johnson, 551 Fifth Avenue, New York, N.Y.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of the total amount of bonds, mortgages, or other securities are: None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

George C. Johnson, publisher. Sworn to and subscribed before me this 17th day of September, 1935. Peggy Horowitz. (My commission expires January 15, 1937.)

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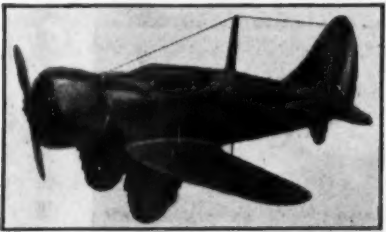
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the same type as Young's and constructed by the author, made a world's record with a flight of 12:23 minutes.

Model airplane history has already been made this year of 1935 for both indoor tractor and indoor commercial records were broken. John Stokes of Huntingdon Valley, Pa., distinguished himself in both events when he placed first and second respectively with flights of 20:53 and 15:05 minutes. Torrey Capo of Boston won the indoor fuselage trophy with a flight of 15:35 minutes. Both Stokes and Capo used paper-braced microfilm-covered commercial fuselages. This national meet was important for the reason that new designs in the way of microfilm propellers were introduced. A model constructed by the author and propelled by a 16-inch microfilm prop made a new world's record of 22:11 minutes in the senior class. This ship had two good flights and each flight surpassed the record mark. A third flight was a bit unfortunate in that it was terminated when the model hit the roof of the 135-foot-high arena and slipped backwards out of control, and then into a dive. The propeller was broken when it hit the hand outstretched to prevent it from hitting the floor. The model would have easily done twenty-four minutes on that flight as it had about 2400 winds and seemed to be flying toward a new all-time world's record. But such is the luck of indoor builders. Carl Goldberg, as usual, came out on top in the open class with an excellent flight of 23:29 minutes.

With the rumor going around that next year's nationals will be held in Akron again, one can only guess at what the new records will be.

The German Air Force in the World War

(Continued from page 13)

known as the "Jagdstaffel Boelcke," in memory of one of their first aces, who organized it in August of 1916.

It was later at various times commanded by Captain Wahl, Lieutenant Bohme, Lieutenant Max Muller, and Lieutenant Carl Bolle. It served on every sector of the Western Front, and ran up a total

of three hundred and thirty-six Allied aircraft to its credit as a unit. Its machines were distinguished by their bright yellow bellies. Jagdstaffel Three, which was known as the Loezer Circus, had for its markings, the black and white checker-board. In March, 1917, Lieutenant Bruno Loerzer assumed command of it, and it operated as a unit, first against the British, the French and then under Captain Betenge against the American Forces from June, 1918, until the Armistice. Another famous unit was Jagdstaffel Eleven. This was under the command of Baron von Richthofen, until he was promoted to the command of one of the new Jagdschwaders. It was officially known as the Bavarian Blue Tails, but was dubbed by the British, the Tango Circus, for the variety of colors of its airplanes. When the war ended, it had three hundred Allied machines to its credit.

Jagdstaffel Fifteen was probably little known to the Americans, as it fought mainly against the French. It was at one time commanded by Lieutenant Gontermann and in December, 1917, Udet was transferred to it, where it was serving on the Aisne front, opposed to the famous Escadrille N.3, or Storks.

Jagdstaffel Twenty-Six was on the British front, operating mostly in the Arras sector. In January, 1917, Bruno Loerzer was transferred to the command of it, from Staffel Three, and remained with it until he was wounded in action on June 15, 1918.

Jagdstaffel Twenty-Seven was commanded by Goehring, until he also took over one of the Jagdschwaders. Jagdstaffel Thirty-Six, in the latter part of the war, was in command of Lieutenant Bongartz, an ace with thirty-six victories, who was wounded in action on March 3, 1918. Staffel Thirty-Seven, another famous unit, served the bulk of its time in Flanders. Udet was also its commander at one time.

The early months of 1918 provided poor flying weather for all of the belligerents, yet despite this, the Allies brought down close to three hundred German planes. During February, the Allies again downed a similar number. The peak of Germany's aerial strength was at its highest in March of 1918. This month, the British Royal Air Force alone, accounted for three hundred and seventy-two planes destroyed, and another two hundred and five driven down out of control, while for April, the R.A.F., claimed one hundred and seventy-two more destroyed, with seventy-five driven down out of control. The worst blow to the Imperial Air Force occurred on May 1st, when on that one day alone, two hundred and forty-eight German airplanes were destroyed. This marked the turning point in air warfare, but in spite of this, the heroism of its personnel continued at a high pitch until the last days.

The greatest problem faced by their air service, was the replacement of personnel and airplanes during active conditions. Each bad weather period came as a welcomed respite, and was utilized in putting their air units back in fighting trim. Materials for aircraft construction were becoming hard to obtain and many substitutions were resorted to. Younger pilots were more in evidence than previously, most of them being noncommissioned officers. This was

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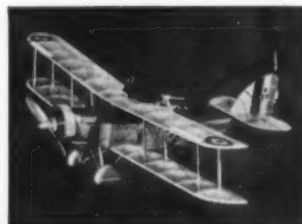
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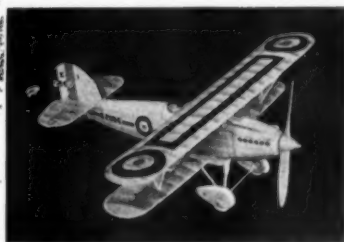
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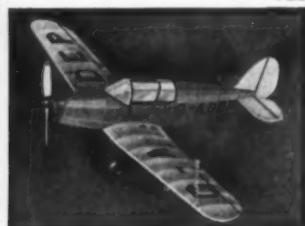
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1/16 x 1/16	15 for .05	1/32 x 2	each .04
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1/4 x 1/2	each .04	ALL OTHER SIZES PRICED PROPORTION- ATELY	
1/2 x 1/2	each .05		
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MACHINE CUT PROPS	PAUL O WINA JAP PROPS	
4" each .02	6" each 10c	
5" each .02 1/2	7" each 12c	
6" each .03	8" each 18c	
7" each .03 1/2	9" each 20c	
8" each .04	10" each 22c	
10" each .05 1/2	12" each 35c	
12" each .08		
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A subscription to MODEL AIRPLANE NEWS will make a swell Christmas Gift. Read our offer on page 48.

something new, as heretofore only commissioned officers flew the ships. But, led by the old Staffel leaders, who had between thirty to fifty planes each to their credit, they did their jobs well.

In reviewing the situation towards the last, it may be wondered at the superiority of numbers of German air units over those of the Allies. Although the Royal Air Force had only eighty-six squadrons on the Western Front, these were maintained always at full strength and at top efficiency. This was not exactly so in the case of the French. Their air service, numbering one hundred and three squadrons, were made up mostly of noncommissioned officers, with a few commissioned officers here and there, as flight and squadron commanders. It has been estimated that eighty percent of their pilots were noncoms. The morale of the French was not as high as that in the British and American services in 1918, nor was there the discipline. Besides the forty-five American squadrons in the zone of advance, there were two hundred and eleven equipping in England, besides many other squadrons which were fitting out in the rear of the armies. This allowed the American squadrons to always remain at full strength.

Had the war continued, the Allies would have put large numbers of bombers in France for the proposed spring drive of 1919. The plans of our own forces contemplated the formation of one hundred and one bombing squadrons, made up of sixteen hundred bombardment planes; while those of the British contemplated increasing their air force from eighty-six squadrons, to one hundred and seventy-nine squadrons, of which sixty-six were to be for long distance bombardment. The value of bombardment aviation became more apparent during this time and both sides engaged in long-distance raids. With the new types of heavy bombers produced by the Germans, it is apparent that had the war continued, they would have been utilized in attacks on American landing places at ports of debarkation and concentration camps in the rear areas.

At the time of the Armistice, the Royal

Air Force had twenty-eight thousand pilots in service and more than forty thousand airplanes had been constructed. France had built fifty-one thousand airplanes, of which nine thousand five hundred were supplied to the Allies. The United States had constructed thirteen thousand eight hundred and ninety-four airplanes, of which three thousand two hundred and twenty-seven were De Havilland 4s. The balance were mostly training planes, but of the De Havillands produced, one thousand four hundred and forty-three were received in France up to November, 1918, or enough to equip sixty squadrons. In addition, four thousand eight hundred and eighty-six airplanes were purchased from the French for the American Army. With such a preponderance of aircraft and a large reserve of men as pilot material for the Allies, it was evident that no nation could hope to compete against such an aggression.

When the fighting was over, the German air units found themselves in a strange predicament. The other forces were retiring to the rear, and they were left isolated on their airdromes without fuel, food, supplies or orders, and it was with difficulty that any semblance of order or morale was to be had at all. Then came the Armistice terms. These provided for the immediate surrender of approximately one hundred and twenty squadrons, while the remainder of their airplanes were to be destroyed.

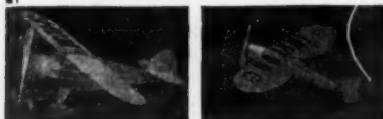
All in all, Germany built forty-eight thousand three hundred and six airplanes during the war period. Of these, fourteen thousand and one were destroyed or surrendered, in addition to the three thousand which were left behind in the airdromes when hostilities ceased, and the two thousand six hundred which were turned over to the Allies immediately following the Armistice terms. Germany's loss in airmen amounted to eleven thousand four hundred, which number includes pilots, observers and bombers.

The aircraft production of this period is worthy of mention. In 1914, only one thousand three hundred and forty-eight airplanes were built. These, of course, do not include those on hand at the outbreak of the war. In 1915, four thousand five hundred and thirty-two were constructed. These orders also brought out the first single-seaters for combat fighting, as the contracts included one biplane pursuit of 180 horsepower, and three hundred and forty-seven monoplane single-seaters of 100 to 160 horsepower. Nineteen sixteen saw eight thousand one hundred and seventy-nine new airplanes, with nineteen thousand seven hundred and forty-six in 1917. Fourteen thousand two hundred more were built up to the Armistice.

At the beginning, a system of designation was provided for their airplanes. These letters preceded the type numeral. For instance, the Fokker D-7 was a single-seater, the seventh of that type constructed by Fokker. A glance at the following designations will readily supply the class of any type of airplane. A, was a Taube, pre-war model; B, a two-seater training plane; C, observation two-seater; CL, ground attack two-seater; D, biplane single-seater pursuit; Dr, triplane single-seater pursuit; E, monoplane single-seater pursuit; G, day

(Continued on page 48)

CONSTRUCTION SETS



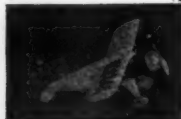
N-155 Monocoupe



N-156 Douglas Observation



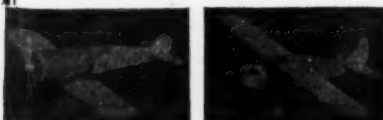
N-157 Curtiss Hawk



N-159 Stinson Reliant

20-inch FLYING MODELS

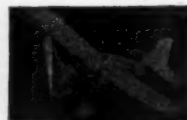
2 Sets for 60c Postpaid



NC-151 Wedell-Williams
17 1/2" wing spread



NC-152 Fairchild 21
20" wing spread



NC-153 Bellanca
20" wing spread



NC-154 SE 5A
15" wing spread

20-inch FLYING MODELS

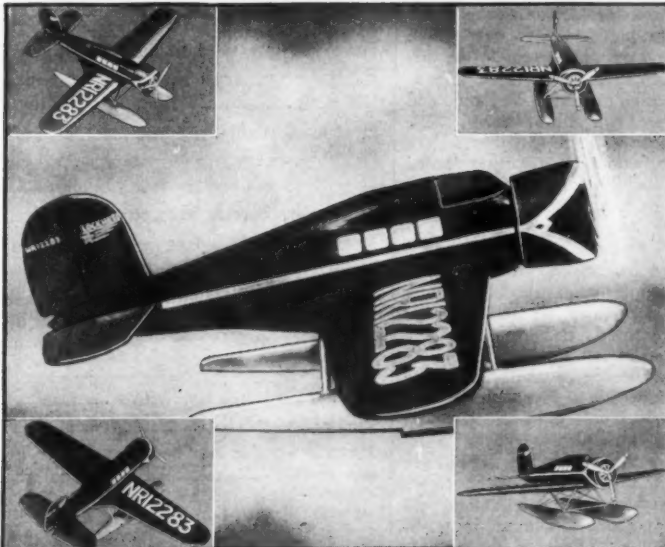
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P. P. Co.



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Contains HEATHE'S new copyrighted, simplified plans and instruction sheets. All parts printed on balsa. Optional supplies for movable controls from the cockpit, carved prop, cowling, loads of wood, cement, dope, colored tissue, rubber, bent wire parts, sandpaper and razor blade, etc.

\$150
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See our bargain supplies below. **FREE**
6 1/16" 2x18 plus 100 1/16 square
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para rubber 1/8" flat.

FREE PHOTO of Will Rogers and Wiley Post Taking Off

We were fortunate in securing a limited number of photo copies of Wiley Post and Will Rogers taking off in the ill-fated Lockheed at Fairbanks, Alaska. These pictures are beautiful, size 5x7 (suitable for framing). **FREE** to every purchaser of \$1.00's worth of kits or more. **FREE.**

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With Movable Controls

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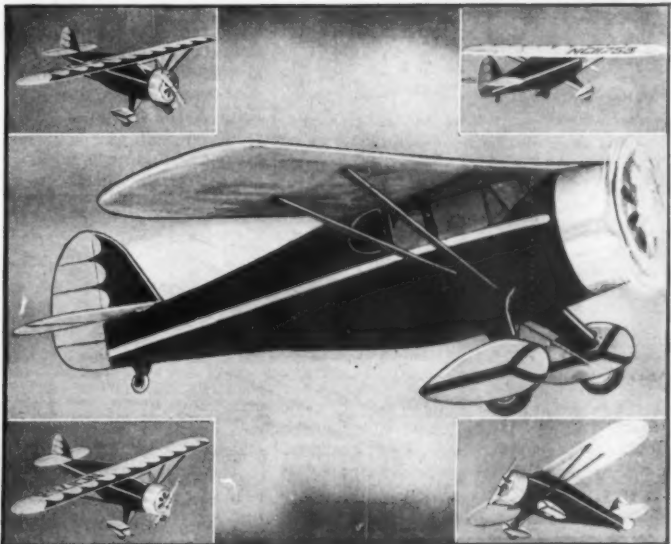
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Gift time is here! HEATHE wants to give everyone a chance to save money. Here's our special combination offer which many of our friends and customers will want to take advantage of for Xmas. Here's what we give you for only \$3.00 postpaid:

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1—Monocoupe Kit	1.50	
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3—Solid Replens.	.25	Postpaid \$3.34

This gives you an additional saving of 10% off our already low prices . . . and don't forget you get a **FREE** Wiley Post-Will Rogers picture described above . . . **ORDER TODAY**



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5 ft. Lengths
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No spruce orders for less than 50c accepted.

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Propeller Blocks
5/8 x 1 1/2 x 18 . . . 12c
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Stronger and lighter than bass or pine
1/2" x 2" x 36" . . . 2 for 15c

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24" x 36" sheet . . . 2 for 15c

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5 ft. straight lengths
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Cut in half except when ordered with 5-ft. spruce.

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For motor mounts, etc.
1/16" thick . . . 15c
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1/4" O.D. per ft. . . 14c

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1/32" dia. x 1/4" long . . . 5c
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For fittings, etc.
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Durable and Flexible
Pint . . . 60c

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4 oz. . . 20c
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COMPARE (A \$3.50 VALUE) COMPARE

Here's a new innovation for model airplane builders. Heathe, the world round leader will take model airplane builders by surprise with this sensational offer. Now you can buy a special combination kit of supplies you need and save money. Here's what this special kit offer contains:

124 Strips, 18 Sheets, etc.
18" BALSA STRIPS AS FOLLOWS: 1/16x1/16, 1/16x3/16, 1/16x1/4, 1/8x1/8, 1/8x3/16, 1/8x1/4, 3/16x3/16, 1/4x1/4, 1/2x1. 18" Sheets—1/32x2, 1/16x2, 1/8x2. 18" Planks—1x1, 2x2. Also: 10—30" Rubber Motors. 1 coil of 10" No. 8 music wire. 1 oz. bottle of HEATHE special cement, clear-dope—3 bottles colored dope, assorted colors . . . 1 oz. of acetone . . . 1/2 doz. sheets of assorted colored tissue . . . 3 insignia sheets . . . 2 15" copyrighted, simplified plans of Fokker D-7 and Curtiss Robin . . . a \$3.50 value, all for \$1.75 postage free.

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**FREE
WITH EVERY
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Actual photo of flying
BUSA and solid A-8 Attack

2 COMPLETE KITS Two kits, complete even to sandpaper. FREE with every order from the list below. One is a flying scale; the other, a solid scale model. This astounding offer made to introduce the finest quality material obtainable. Act today. Your choice of any one of these combinations:

- (1) Flying BUSA, Solid Curtiss Attack
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All materials guaranteed. 24-hour service.

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18" STRIPS			
1/16 sq.	20 for .05	1/2 oz. Bottle.	.05
1/16x1/8	10 for .05	1 oz. Bottle.	.15
3/32x3/32	10 for .05	3 oz. Can.	.25
1/4 sq.	10 for .05		
1/2 sq.	5 for .05		
3/4 sq.	3 for .05		
1 sq.	2 for .05		
1 1/4 sq.	1 for .06		

18" SHEETS

1/32x2	10 for .10
1/16x2	6 for .13
3/32x2	5 for .10
1/4x2	4 for .12
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1x3	1 for .15
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All above sizes available on 36" lengths.

Double cost of 18". Add 10c postage extra.

Balsa Propeller Blocks

1/2x1/2x5	7 for .05
1/2x1/2x6	5 for .05
1/2x1/2x8	4 for .05
3/4x1/2x7	3 for .06
3/4x1/2x8	3 for .06
3/4x1/2x10	3 for .09
3/4x1/2x12	1 for .06
1x1/2x12	1 for .08
1x1/2x15	1 for .09

Colorless Cement

1/2 oz. Tube.	.05
1 oz. Bottle.	.15
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Model Dope Brushes

Per doz.	.10
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1/2 oz.	.05
1 oz. Bottle.	.15
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Ordering instructions: 1. No orders under 50c. 2. Add 15c postage plus 5c postage for free kit.

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MODEL AIRPLANE UTILITY CO.

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What Do Gas Models Mean to You?

(Continued from page 8)

It is enjoyable beyond words as those who have entertained this sport can testify, chiefly because it allows absolute self-expression, the root of all enjoyment.

The health of human beings depends largely upon spontaneous outdoor physical activity. Following a gas job over rough country in the open air, provides just this in bountiful proportions. In fact, it provides both work and relaxation of mind and body, the basis of a healthful life.

The "cause" of aviation and the welfare of young men would be greatly retarded without the possibility of pursuing this activity, so let us put our shoulders to the wheel and help to advance this great art.

The dangers are insignificant. Never to our knowledge has anyone been seriously injured by following gas-model building and flying. Everything we undertake in our daily activities is dangerous to some degree. However, not the fact that there is danger, but the degree of danger is the important consideration. Certainly there is no more danger involved than driving an automobile, riding a bicycle, playing baseball, or crossing Fifth Avenue, New York City.

Therefore, MODEL AIRPLANE NEWS thoroughly approves of this sport and will do everything possible to advance its popularity and growth. However, we wish to know details of your activities with "gas jobs" and what you think about this sport, so we are urgently requesting you to fill in the following coupon, cut it out, and send it to MODEL AIRPLANE NEWS, 551 Fifth Avenue, New York City. By doing this you will render a great service to every model fan who wishes to continue his activities in this field.

Gas Model History

Fill in and mail immediately to: MODEL AIRPLANE NEWS, 551 Fifth Ave., New York City.

Would you like to build a gas model?.....

Are you planning or building a gas model now?

Have you completed a gas model?.....

Have you attempted to fly your own gas model?

Did it fly?.....

How many flights have you made with gas models?

How many gas models have you built?.....

How many crashes have occurred?.....

Does your model land without crashing usually if it meets no obstruction?.....

Have you ever been injured while operating a gas model?.....If so to what extent?

Has anyone else ever been injured by your gas model?.....If so to what extent?

Has your gas model ever caused damage to property of others?.....If so what was the extent of the damage?.....

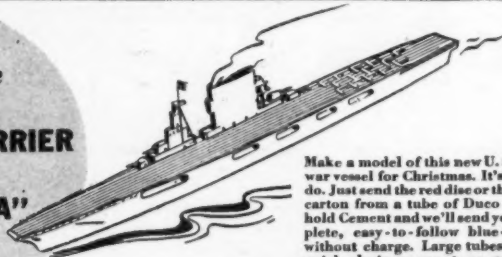
Do you wish this activity to be abolished?

What do you think of this activity?.....

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AIRCRAFT CARRIER

"SARATOGA"



Make a model of this new U.S. Navy war vessel for Christmas. It's easy to do. Just send the red disc or the green carton from a tube of Duco Household Cement and we'll send you complete, easy-to-follow blue-prints, without charge. Large tubes of this quick-drying cement on sale for 25c at drug, stationery and hardware stores. Send for blue prints to DU PONT, Dept. F-6, Wilmington, Del.

TRANSPARENT : WATERPROOF

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DUCO Household CEMENT

Learn How to Operate a Plane In Your Own Home with this thrilling

TRAINING PLANE

An Amazing New Invention! Not a Toy!

A practical training plane developed at the Casey Jones School of Aeronautics, Newark, N. J. endorsed by such famous pilots as Casey Jones, Amelia Earhart, Lieutenant-Colonel Vaughn, Lee Warrender and many others. Learn how to take off, climb, dive, bank, turn; how to avoid side-slips, stalls, tailspins, and other dangers; teaches you all about flying—and works just like a real airplane. Go through the actual maneuvers of the aces. Come complete, all ready to assemble. Simple directions with every set. Anyone can set it up in a very short time. Actually promotes knowledge of aviation.

Training Plane Dept., Heaney Laboratory, Glenn Curtis Airport, Jackson Heights, L. I.

\$1

At Your Dealer

\$1.15 by mail

\$1.30 W. of

Mississippi

\$1.60 Foreign

Clip this ad.

and mail with

remittance.

G.O.D. 15c extra

Important Facts of Rubber Power (Continued from page 21)

cross-section area, or to the number of strands used; that is to $\sqrt{\frac{I}{S}}$ or to $\sqrt{\frac{I}{N}}$

67. The work that can be stored in this type of motor is proportional to the size of the strands (S), the number of strands being the same, or proportional to the number of strands (N), approximately, the size of the strands being constant.

68. The stored work is proportional also to (S), the total cross-sectional area of the rubber in the motor being the same in all cases. This means the larger the strands with any given total rubber cross-section area, the greater the amount of work it is possible to store.

Lubricated Stretched Black Rubber

69. Motors of this character composed of $\frac{1}{8} \times 1/32$ rubber develop about 22% more maximum torque than motors of lubricated and stretched brown rubber, the motors in each case compared containing the same number of strands.

70. The smaller the size of the strands composing a motor, the less will be the maximum torque of black rubber compared to brown rubber.

71. Use black rubber when a high initial or "take-off" torque is required and the motor is to be composed of large or many strands of rubber.

72. Black rubber gives about 25% less torque than brown rubber after the first initial torque has been spent.

73. The fewer or smaller the strands are, the less is the drop in the torque after the initial impulse compared to brown rubber.

74. For sustained rather than initial torque (power) use brown rubber.

75. Black and brown rubber will absorb about the same number of turns.

76. About 15% more work can be stored in brown rubber than in black when six or more strands are used in a motor.

77. When less than six strands are used black rubber will absorb and deliver about 15% more work than brown rubber.

78. The torque of a motor is proportional approximately to the cross-section area of rubber in a motor, times the square root of the cross section area; i.e., $S\sqrt{S}$, where (S) equals the cross-section area.

79. The number of turns that can be put into a motor is inversely proportional to the square root of the rubber cross-section area, approximately; i.e., to $\sqrt{\frac{I}{S}}$

where (S) equals the rubber cross-section area.

80. The finer the strands used, the greater is the number of turns that can be stored, the cross section area being the same.

81. The larger the strands, the greater is the torque.

82. All other factors being equal, the torque is a measure of the speed and climbing ability of the plane.

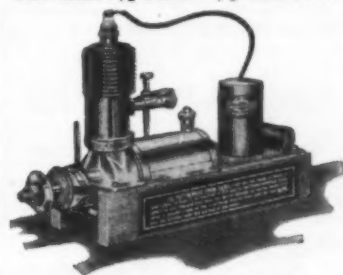
83. All other factors being equal, the

Power and Speed Less Weight

BROWN MOTOR

GASOLINE ENGINE For Model Airplanes

Greatest Power Per Unit of Weight
Bare Motor $6\frac{1}{2}$ Ounces— $\frac{1}{8}$ Horse Power



Fully Covered by Patents Pending

A REAL MOTOR Guaranteed to Run

Sold as a Complete Unit. \$21.50
Postpaid U. S. A. No Extras to Buy

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HOW THESE MADISON MODELS DO FLY!



Most Complete Kits
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15" JUNKERS D-1
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20" DE WOITINE D-33
MADISON UMBRELLA
TYPE (20" DIAMETER)

50c
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POSTPAID
REMIT CASH
OR MONEY OR-
DER. Canada add
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VOUGHT CORSAIR 03U-4
15" model of the ship board type Navy planes
used on aircraft carriers. 50c postpaid.

Madison Kits Contain
1—Finished Hand-Carved (Paulownia) Hard
Wood Prop.
1—2" Aluminum Drag Ring where required.
2—Port and Rear Hooks—finished
1—1" Hard Wood wheels—finished
2—Sheets of colored Japanese tissue
1—Bottle of Alco Cement, Ribbs, and Bulk-
heads printed on Balsu Wood
1—Strand of 3/16" Rubber
1—Piece of Celluloid 1—Full size plan
1—1 Foot length .028 wire
All necessary wood for Stringers and Land-
ing Gear. All Madison Kits include a 5/4"
Paulownia wood propeller—hand finished,
true and balanced.

MADISON QUALITY SUPPLIES!

Highest Quality BALSA Lightest and best. Clear straight-grained stock, cut to convenient sizes.

10" Strips		1/2"	3 for .10
1/16x1/16	20 for .08	1/2x1/2	2 for .10
1/16x1/8	10 for .08	1/2x1/4	2 for .10
1/16x1/4	10 for .08	1/2x1/8	2 for .10
1/8x1/8	10 for .08	1/2x1/16	2 for .10
1/8x1/4	10 for .08	1/2x1/32	2 for .10
1/4x1/4	10 for .08	1/2x1/64	2 for .10
1/4x1/2	10 for .08	1/2x1/128	2 for .10
1/2x1/2	10 for .08	1/2x1/256	2 for .10
1/2x1/4	10 for .08	1/2x1/512	2 for .10
1/2x1/8	10 for .08	1/2x1/1024	2 for .10
1/2x1/16	10 for .08	1/2x1/2048	2 for .10
1/2x1/32	10 for .08	1/2x1/4096	2 for .10
1/2x1/64	10 for .08	1/2x1/8192	2 for .10
1/2x1/128	10 for .08	1/2x1/16384	2 for .10
1/2x1/256	10 for .08	1/2x1/32768	2 for .10
1/2x1/512	10 for .08	1/2x1/65536	2 for .10
1/2x1/1024	10 for .08	1/2x1/131072	2 for .10
1/2x1/2048	10 for .08	1/2x1/262144	2 for .10
1/2x1/4096	10 for .08	1/2x1/524288	2 for .10
1/2x1/8192	10 for .08	1/2x1/1048576	2 for .10
1/2x1/16384	10 for .08	1/2x1/2097152	2 for .10
1/2x1/32768	10 for .08	1/2x1/4194304	2 for .10
1/2x1/65536	10 for .08	1/2x1/8388608	2 for .10
1/2x1/131072	10 for .08	1/2x1/16777216	2 for .10
1/2x1/262144	10 for .08	1/2x1/33554432	2 for .10
1/2x1/524288	10 for .08	1/2x1/67108864	2 for .10
1/2x1/1048576	10 for .08	1/2x1/134217728	2 for .10
1/2x1/2097152	10 for .08	1/2x1/268435456	2 for .10
1/2x1/4194304	10 for .08	1/2x1/536870912	2 for .10
1/2x1/8388608	10 for .08	1/2x1/1073741824	2 for .10
1/2x1/16777216	10 for .08	1/2x1/2147483648	2 for .10
1/2x1/33554432	10 for .08	1/2x1/4294967296	2 for .10
1/2x1/67108864	10 for .08	1/2x1/8589934592	2 for .10
1/2x1/134217728	10 for .08	1/2x1/17179869184	2 for .10
1/2x1/268435456	10 for .08	1/2x1/34359738368	2 for .10
1/2x1/536870912	10 for .08	1/2x1/68719476736	2 for .10
1/2x1/1073741824	10 for .08	1/2x1/137438953472	2 for .10
1/2x1/2147483648	10 for .08	1/2x1/274877906944	2 for .10
1/2x1/4294967296	10 for .08	1/2x1/549755813888	2 for .10
1/2x1/8589934592	10 for .08	1/2x1/1099511627776	2 for .10
1/2x1/17179869184	10 for .08	1/2x1/2199023255552	2 for .10
1/2x1/34359738368	10 for .08	1/2x1/4398046511104	2 for .10
1/2x1/68719476736	10 for .08	1/2x1/8796093022208	2 for .10
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1/2x1/8796093022208	10 for .08	1/2x1/1125899906842624	2 for .10
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1/2x1/35184372088832	10 for .08	1/2x1/4503599627370496	2 for .10
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1/2x1/562949953421312	10 for .08	1/2x1/72057594037927936	2 for .10
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1/2x1/9223372036854775808	10 for .08	1/2x1/1180591620717411303424	2 for .10
1/2x1/147573952589676412928	10 for .08	1/2x1/2361183241434822606848	2 for .10
1/2x1/295147905179352825856	10 for .08	1/2x1/4722366482869645213696	2 for .10
1/2x1/590295810358705651712	10 for .08	1/2x1/9444732965739290427392	2 for .10
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1/2x1/2361183241434822606848	10 for .08	1/2x1/37778931862957161709568	2 for .10
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1/2x1/9444732965739290427392	10 for .08	1/2x1/151115727451828646838272	2 for .10
1/2x1/18889465931478580854784	10 for .08	1/2x1/302231454903657293676544	2 for .10
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number of turns in a motor is a measure of the length of time a propeller will run if the motor is wound completely.

84. All other factors being the same, the work stored in a motor is a measure of the duration of the plane.

(A complete set of formulae for torque, turns, and work for various motors are given in the April, May, June, and July 1935 issues of MODEL AIRPLANE NEWS.)

Application of Power

85. The velocity of rotation of a propeller is proportional to \sqrt{N} or, $V = K\sqrt{N}$.

86. The duration of turning of a propeller when the motor is fully wound is proportional to $\frac{T}{\sqrt{N}}$ or $E = K\frac{T}{\sqrt{N}}$ where (V) represents velocity, (E) represents duration, (T) represents the number of turns when fully wound and (N) represents the number of strands in the motor.

87. Multiple motors give less total duration than single motors as a general rule.

88. Multiple motors give from 10% to 20% greater propeller run but a shorter glide due to the greater weight of the model that ensues from their use.

89. Any multiple motor arrangement in which the motors must be wound in the same direction is disadvantageous as the body has to stand the twisting effect of the sum of the torque of both motors.

90. Any multiple motor system in which the motors are wound in opposite directions is the best system to use because the twisting effect of one is balanced by the twisting tendency of the other. In this case the fuselage has to withstand only the pull or tension of the motors.

This summary will be concluded in our next issue.

Blazing Trails at the National Air Races

(Continued from page 7)

ing the smallest plane at the races, made doubly sure of his distinction by having a still smaller ship present this year. It looked like something that was built in his dining room between meals, it was so small. His other little plane, the Tilbury Flash, was a good performer.

While wandering about I came across a small, bright red racer all by itself in another hangar—far from the hum-drum of the other hangar where pilots and mechanics were falling all over each other in hasty fashion. It was all primed up and ready to go. The ship was none other than Marion McKeen's Brown racer, "Miss Los Angeles." Marion McKeen was the dark horse of this year's races, but engine trouble forced him to take it easy around the pylons. He probably got more publicity for having engine trouble than if he had won all the races.

The first day of the Henderson outing, before referred to as the National Air Races, was officially opened with a big bang and a splash soon followed by an announcement in the papers that all events would have to be postponed because of the steady downpour of rain—and more rain. However, the Bendix Race from California to Cleveland took place. Some of the racers were equipped with blind flying instruments; others were not. Instruments or no instruments they all took to the air. Cecil Allen was killed outright. Earl Ortman, one of the favorites, felt his way as far as Kansas City, Mo.; Roy Leonard dropped down in Wichita, Kansas, and Jacqueline Cochran made a speedy trip from the starting line to Arizona, doing another Laura Ingalls. The remaining five contestants swam into Cleveland in fine order.

Well we have learned some good things from this year's Bendix. The five planes that completed the race, Benny Howard's "Mister Mulligan," Roscoe Turner's Wedell-Williams, Russell Thaw's Northrop, Roy Hunt's Orion, and Amelia Earhart's Vega, are much different from the small, wing-fluttering racers and larger steam-boilers that formerly competed in this mad speed dash. Things are getting commercial. Three of the ships are standard stock model commercial jobs with all the necessities for flying in such a race. Benny Howard's ship is able to haul four people through the air with apparent safety, and even that plane is about to give birth to a new sport plane. Turner had the only purely one-man racing plane, and this is the best racing plane in America. Though Roscoe did not have all the blind flying equipment of his four competitors, he has flown the route so much that if he pulled his red and white helmet over his eyes, he could still hit Cleveland right on the nose.

Thaw made the trip nonstop. Three other finishers almost did. Turner alone used the "hedge hopping" method because of his ship's small fuel capacity. Though his plane was the fastest, it did not win the race on account of the small amount of fuel carried. As Benny Howard said, "The only reason Roscoe lost was because he let a photographer take 24 seconds too long in snapping his picture at one of his stop-over ports." You probably know that

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OUTDOOR: William Ying's 41m 19s D Fuselage. Robert Cahill's 33m C Fuselage. Daniel Cline's 38m plus Tractor. Joe Kovel's 64m 40s Gas Job.

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LAST MINUTE NEWS

Received at the last minute the following plans: Maxwell Bassett's cross-country 2 hours 35 minute Gas Job. Leo Weiss' 64m Gasoline Model National Contest winner. Leslie Adams' 3m Compressed Air Model. Wallace Simmers' 21m 10s Twin. And Ralph Kummer's 17m 49.8s Indoor 8. This addition brings the total number of plans to over 30! What a Bay!

Howard beat Turner by only 23½ seconds to win the race. This shows the advantage of having a long-range racer. The London-Melbourne race has also illustrated this point. Even the nonfinishers had long-range characteristics. So in the future we may see all the racers flying the California-Cleveland stretch nonstop (if the Races remain at Cleveland).

Allen and Ortman should never have taken off. About all they had to fly by was their compasses. When you got up in the "soup" that was hovering between California and Cleveland on that memorable day, you wanted to know more than just where the North Pole is located. With these circumstances prevailing, together with a very fast ship that was said by many people to have been built "on a Sunday afternoon," poor Allen had only one chance in a hundred of finishing the Bendix alive. But still they let him go up. A large entry list and a good reliable group of planes on the whole was certainly encouraging this year, though no records of importance were broken. (How could they be with such weather?)

The following three days were full of sunshine and the show took place in fine order. There were parachute jumping, Army and Marine maneuvers, all sorts of noncompos stunting, thrilling air races around four pylons, and all the rest that goes with the Henderson's spectacular air show. Irwin Davis was one of the outstanding 'chute jumpers. Though he risked his life many times at the Races, it was not until a few weeks later, while a mere passenger in an airplane, that his name reached the first page of the newspapers. He was one of the two men that had the free-for-all wrestling match with the late and bemoaned baseball player, Len Koeckne, while flying towards New York.

Not satisfied with having American commercial airplanes show up the specially built racing planes in the London-Melbourne race, Major de Seversky had to enter his giant amphibian in the Thompson Trophy Race, the world's greatest annual air classic. Believe it or not it won fifth place out of a field of ten. If this uncontrolled rise to fame of the commercial airplane keeps up we will soon see giant Douglas transports winging their way around the pylons with their 18 passengers waving joyously to the awestricken crowds in the grandstand. What a glorious National Air Race that would be!

The biggest drawback of the air carnival is engine trouble. Nearly every plane had engine trouble during some part of the show as already illustrated by Marion McKeen's and the Delgado's adventures. Roger Don Rae not only had engine trouble but the oil that belched from the engine caught fire, and Rae went whizzing by the grandstands nursing a barnfire up forward.

Tilbury's pocket-size airplane was disqualified from participation because of its minuteness. Evidently the minimum size of a racing plane has been reached. Just what will be the maximum size? Already news comes that there will be a twin-engined plane at next year's National Air Races de luxe.

No one can tell by studying the trend in the design of racing planes in the past few years just what will develop. It is

true that a racing plane designer, with an axe in his hand, no longer takes a good look at his new creation and then decides to chop off a couple of feet of the wing to see if it will go faster. They are now applying mathematics to their design, but it is not the accumulation of aerodynamic knowledge that determines the racing planes of the future, it is the question of who is going to pay the expenses. Benny Howard and all the others have original and sound ideas on how to build a plane that could do at least 400 m.p.h., but the main question is as to where is anyone that has \$200,000 or more to spend for such planes beside Howard Hughes? All that is left to do is "clean up" on the present job and put a new smoother paint job on it. Seldom is a new racer created with a superior performance over its predecessors of just a short while back. Some have been such abortions that there appears to be something radically wrong with its designer. The worrying of where he is going to get the money to pay for his new plane has just about driven him insane.

TRAVIS MULTI-FLEX BEARINGS © 1935—TRAVIS

PATENT No. 1,995,447



The "SUPERCHARGER" of model airplane performance.

Some of its astounding qualities:

1. Cures stalling when correctly used!!
2. Gives as high as 35% increase in aerodynamic efficiency over other bearings!!
3. Reduces motor oscillation and absorbs vibration!!
4. Protects propeller from damage in high-speed, head-on crashes!!

Travis Multi-Flex Bearing, 20c each, P.P.T. M.-F. B. with Free Wheeling Clutch, 55c P.P. This is a sure-fire free wheeling clutch which disconnects completely the rubber motor from the shaft. It eliminates the shifting of Drag-Center in the glide.

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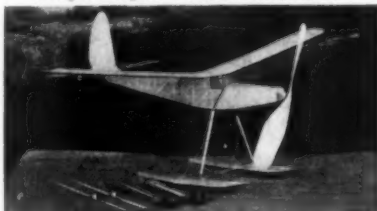
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INTRODUCING! THE NEW DOUGLAS-DESIGNED "SPACE-CONQUERER"—HYDRO-PLANE-LANDPLANE-and SKIPLANE—all in one MODEL

Change from pontoons to M & M Wheels to skis in a few minutes. The Model pictured has an Unofficial Record of 19 min. 25 sec. with M & M Wheels. Beautiful Water Take Offs and Flights Up to 2½ Min. Have Been Made—Flies Equally As Well With Skis. The Kits to Build Douglas-Designed Models Are Second to None—For Value—Completeness—and It Doesn't Require a Philadelphia Lawyer to Figure Out

HOW TO BUILD MODELS FROM DOUGLAS DRAWINGS. MAKE IT A DOUGLAS KIT FOR XMAS & YOU WON'T BE DISAPPOINTED.

Douglas-Designed "SPACE-CONQUERER"



Wing span 36", length 27", wt. 2.8 oz. This model is very easy to build, and the flights it makes are really amazing. Complete Kit, \$1.75 Postpaid

Douglas-Designed "UNIVERSAL SPEEDSTER"



Span 36". Length 25". Wt. 2 oz. This new Douglas-Designed speed model has absolutely EVERYTHING you need. ALTITUDE—SPEED—ENDURANCE. perfect GLIDE and M & M Model Wheels for smooth landings. Complete Kit only \$1.50 P.P.

Douglas-Designed "FLYING CLOUD"



Wing span 36 in.; length 24 in.; weight 3 oz. This model is the result of nearly a year of experimental work and for consistent flying this model is in a class by itself.

Complete Kit with M & M Model Wheels \$1.75 P.P.

NOTE! The three above kits contain glue, dope, tissue, rubber, shaped props, free wheeling prop, shafts, parts requiring machine work cut to shape. Other parts clearly printed on "AAA" balsa strips cut to size, M & M Model Wheels and full size drawing.

GAS MODEL BUILDERS send us your list of materials for estimates and gas model price list.

Everything to build Model Airplanes. Write for New Price List. DISCOUNTS TO DEALERS.

Douglas-Designed ¼" Flying Scale Models are exact reproductions. Our careful design eliminates warping and increased strength with method of construction within the ability of any one, everything clearly detailed on full sized working drawings. All parts requiring machine work cut to shape, all other parts clearly printed on "AAA" Balsa.

FAIRCHILD "22" WARNER



Tried, Tested and Proven to be one of the sweetest looking flying models ever produced.

Wing Span 24". Length 16". Weight 2.2 oz. Colored red and gray, black detail. Kit contains full size detailed drawing. 1 oz. glue. 1 oz. paper cement. 1½ oz. grey. 1 oz. red. Douglas Gloss Dope, and black for detail. COMPLETE KIT M & M Model Wheels.....\$2.50 WITH Hard Wood Wheels.....1.95

"FOKKER D-17 CONQUERER"



With its tapered wings and well streamlined fuselage and landing gear, this is one of the most graceful models you have ever seen, as well as a fine flyer. Finish is light gray, with bright red, white, blue, and yellow insignia. Wing Span 23". Length 17". Wt. 2.4. Kit contains 1 oz. Glue, 1 oz. Paper Cement, 3 oz. Douglas Gloss Gray Dope, and Black for detail. COMPLETE KIT M & M Model Wheels.....\$2.75 WITH Hard Wood Wheels.....2.25

FAIRCHILD "24" CIRRUSS



Wing span 26", length 17", Wt. 2 oz. Colored blue and yellow, black detail. Same high grade kit as Fairchild "22" and "D-17".

COMPLETE KIT M & M Model Wheels.....\$3.30 WITH Hard Wood Wheels.....1.95

Send Money Orders or CASH only. When sending cash fasten coins to letter with adhesive tape.

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1460 North 45th St., Dept. 3, SEATTLE, WASH., U.S.A.

**POWERFUL! FLYERS!
DESIGNED TO PERFECTION****24 INCH WING SPAN****NEW FLYING SCALE MODELS 25c Plus 10c post.****With Movable Controls****TAYLOR CUB**

Amazingly easy to build. These kits contain everything for the model. There are six models to choose from:

Taylor Cub	Fokker D-8
Fairchild 24	Nieuport XVII-C1
Bristol Fighter F2B	Monocoupe

12 INCH SOLID MODELS 15c postpaid MARVELOUS VALUE

Six to choose from:

Curtiss Swift	Lockheed Orion
Douglas Y-43-10	A-8 Attack
Monocoupe	Stinson Reliant

DEALERS, JOBBERS and AGENTS

Here is a very fast seller! A solid replica model of **Tailspin Tommy's Stratos-ship** as featured in the famous daily and Sunday newspaper comic for which we have the copyright under contract exclusively.

Write for special discounts on all of our models.

Airway Model Plane Co.

1418 Eastern Parkway Brooklyn, New York

A CORRECTION

The illustration of the Propeller in the International Model Company advertisement in the November issue was incorrect. The picture illustrated their "Tru-Detail" Heavy Duty Propeller which should have been the "Steel Type" Propeller. This correction is published to clear up any misunderstanding on the part of any reader who received a Propeller different from that shown in the advertisement.

Airways—Here and There*(Continued from page 23)*

enough for planes, so I spend my spare time with models and with MODEL AIRPLANE NEWS. Both of them are a great joy, and help spend a lot of lonely hours until my return to the States."

To prove his interest Mr. Weygint sends us picture No. 6, of the scale Boeing P26-A, which he has just completed. It is built up in considerable detail and required 100 hours to complete. The wingspread is twenty-one inches and it is seventeen inches long. The motor is made of approximately 125 separate parts. Mr. Weygint says this is his first built-up job.

An unusual commercial contest model is shown in picture No. 7. It was built by Walter Faryn of 437 East Fifth St., New York City. Considerable attention has been paid to streamlining and details. The landing struts are neatly made and the fin and stabilizer are carefully streamlined into the body. Stability is obtained by the use of a polyhedral wing, the wing tips being turned up and swept back slightly. Mr. Faryn does not tell us what results he has had with this ship. We would be interested to hear from him.

MODEL NEWS FROM OTHER COUNTRIES**England**

It appears that American models have not only captured the attention of English builders through the winning of the Wakefield Trophy by Gordon S. Light, but American gliders have also made their appearance in the British ranks. Mr. J. P. Penny of 83 Coldharbour Road, Redland, Bristol, England, writes us telling of the excellent performance which he obtained with a Robert File glider, which he built from plans in MODEL AIRPLANE NEWS. Mr. Penny is shown with this ship in picture No. 8. He says this glider also was very successful. On one of its flights it was lost to sight after eight and a half minutes. Later it was found three and a

half miles away. The ship came to an untimely end when it landed in the top of a 60-foot tree on a subsequent flight. It remained in the tree for twelve days, when the body and wings parted company. Both parts of the machine were retrieved. Mr. Penny was surprised that neither the fuselage nor the wings were damaged, except for a slight rip in the paper; even though the wind and rain had wreaked their vengeance upon it for ten days. An interesting note at the bottom of his letter is as follows:

"I may add that I built an all-balsa model airplane last year with a 6-foot span, which had a flight of forty-five minutes."

Australia

Gas model building has taken Australia by storm. Mr. Freshman, of the Model Flying Club of Australia, is encouraging this activity intensively. Recently a ship which Jack Finneran built made a flight of fifteen minutes and obtained an altitude of 700 feet. This was the longest flight made up to that time.

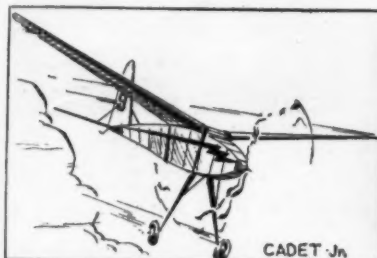
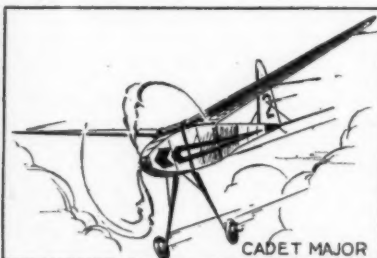
However, young men in Australia are taking up this activity, as may be seen in picture No. 9, which shows John Duffey with the completed framework of Joe Kovel's model, which he has built from plans in MODEL AIRPLANE NEWS.

Japan

Mr. Hiroyasu Minowa of No. 3 Wakamatsucho, Ushigome-Ku, Tokyo, Japan, sends us picture No. 10 of the junior members of the famous Nishiki Model Club of which he is the guiding spirit. This picture was taken at one of the competitions which are held frequently in Tokyo. It is interesting to note that not only the older young men in Japan are interested in this sport, but the younger group are also, some of whom cannot be over nine or ten years old, judging from the picture.

Russia

Picture No. 11 indicates the interest which is shown in model building in Russia. Here you see several Soviet school chil-

A REVELATION IN MODEL AIRPLANES**SPAN 20"****AREA 45 SQ. IN.****FOR REAL FLIGHTS****SPAN 30"****AREA 102 SQ. IN.**

The Bunch Company has earned the designation—Home of Championship Airplanes—and as such is proud to present the CADET MAJOR and the CADET Jr. These airplanes embody the very most advanced aerodynamic and structural engineering and have been brutally test flown in hundreds of flights. It was our determination to present the ultimate in flying model airplanes and the CADETS have attained the goal set by this high ideal. The airplanes were publicly introduced last week and hundreds of witnesses were thrilled at the snappy pursuit style performance of the CADET Jr. and amazed at the powerful sweeping climb of the CADET MAJOR to high altitude there, soaring minute after minute like a condor. At Mines Field, Lemmon flew a CADET MAJOR 1 hour and 35 minutes. At Grand Central, Alberg flew a CADET Jr. 10½ minutes. At Clover Field, in a strong gusty sea breeze, Broughton flew both airplanes and witnesses marvelled at their exceptional stability.

CADETS can "take the wind." The CADETS feature a new high efficiency and stable airfoil that is an aerodynamic achievement. A new fuselage shape which smooths out the airflow. A new freewheeler and many advanced improvements that place them miles ahead of just model airplanes. The CADET MAJOR features a new tail section that utilizes the slip stream for an automatic pilot.

The Bunch Company first with the latest—the result—model builders everywhere "CADET-minded." The rush is on to get CADETS. Hurry and order yours. You will receive one of the most complete model airplane kits ever sold. The plans are an education in the design and flying of model airplanes. Every step in construction and operation is shown in four ways, by mechanical drawing, by sketch, by perspective and by printed step-by-step instructions. The finest materials are provided and even include rubber lubricant and complete new style decorations. All packed securely in our new designed trough style box.

Complete Kit, CADET MAJOR, Postpaid.....	\$1.50
Complete Kit, CADET Jr.	50c Plus 10c Postage
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Catalogue 3c stamp

BUNCH MODEL AIRPLANE CO.

2303 S. Hoover St.

Los Angeles, Calif.

dren with the model planes they have constructed. Model aviation is a compulsory subject in the schools of Russia because they realize the value of this sport in training young men in aviation, as well as in the manual arts. Thus, the principles of flight are instilled into the Russian children at an early date. Therefore thinking along aeronautic lines becomes instinctive.

CLUB NEWS California

One of the most important events to take place each year is the California State Champion Model Airplane Contest held at the California State Fair. It was held on September 1st and 2nd at Sacramento. The director of the contest was Waldemar E. Doyal, Science Instructor in the Sacramento High School. He was assisted by Mr. Hilton F. Lusk, Chairman of the Technical Department. An interesting array of events were held. They were as follows: All-Balsa Hand-Launched Glider, Stick Model, Fuselage Model Flying Scale Model, Racing Model, Novelty Flying, Compressed Air Powered Model, Gasoline Engine Powered Model, Exhibition Scale Model.

Picture No. 12 shows Louis Schocke and trophies he won at this contest. He won the Fuselage and Flying Scale Events. The three little cups appearing in the picture were won for defending in 1935 the events that he won in 1934; namely, Fuselage, Flying Scale and Speed.

Incidentally, the winning of the Flying Scale Event for two years in succession brought Schocke an \$800 scholarship at the Boeing School of Aeronautics, at Oakland.

Picture No. 13 shows Bill Atwood of Glendale, winner of the Gas Event, and his little ship. Atwood not only built the ship, but also designed and built his engine. He is an engineer with the Douglas Airplane Company. Atwood was 1934 California Gas Model Champion.

Newark, New Jersey

One of the important events that took place in the East recently was the Third Model Airplane Builders' Convention, held at L. Bamberger & Company, Newark, on September 14th. This convention may have a far-reaching effect, inasmuch as policies, rules, and future procedures in all model aviation work were discussed. It was attended by most of the men prominent in model aviation and by the foremost model builders.

One of the main points of note was the suggestion that gas model contests be discontinued. The gas model cause was immediately championed and a discussion ensued which may continue for several months. (We suggest that you read the editorial on page 6). The general feeling among those who attended the convention was that they need not take this threat to gas model flying too seriously.

Among other features that were discussed was the advisability of increasing wing loading on models in order to restrain their flights within reasonable limits. The whole atmosphere of the convention was air-minded to a high degree. This appeared to be catching, for when the desert appeared the ice cream arrived on the plates in the form of an airplane. We do not doubt that frozen airplanes is a new

delicacy of which many model builders have not partaken.

We wish to praise Mr. Nathan Polk, who is the director of the Bamberger Aerieo Club, for organizing and carrying out the program in an efficient manner.

Tailspins is the official organ of the club and is edited by Philip Zecchitella. In a recent issue it gives a very realistic account of the remarks and findings of the convention. Picture No. 14 shows a group of model builders who attended the convention, with Joe Kovel holding the world's record gas model which was lost recently near Hadley Field, N.J. Notify us if found. Left to right, they are: Leo Weiss, 1935 Texaco Trophy winner, Maxwell Bassett, twice Texaco Trophy winner, Joe Kovel, present world's record holder, Gordon Light, Wakefield winner, William Wert, Phila. Junior Champion, and Charles Heintz, Philadelphia Senior Champion.

Ohio

Mr. Albert W. Barkdull of Shelby, Ohio, is kind enough to send us an account of the North Central Ohio Model Air Meet, held at the Mansfield Airport, Sunday, August 25th. Mr. Barkdull was director of the contest.

"A highlight of the meet was the performance of the 16-foot model Bowlus Sailplane, shown in picture No. 15. All the flyers stopped to watch the slow, smooth,



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MACHINE GUNS

3/4" long Browning.....	5c	3/4" long with pin.....	5c
1 1/2" Browning with pin 5c		1 1/2" long.....	10c
1 1/2" Spandau.....	15c	1 1/2" long.....	15c
2" long Browning.....	15c		
3" long Marlin.....	15c		
1 1/2" Marlin with pin.....	10c		

CONTROL HORNS

3/4" long Set of 6.....	25c
1 1/2" long Set of 6.....	35c

DIE-CAST MOTORS

1" dia. 9 cylinder.....	25c
1 1/2" dia. 9 cylinder.....	35c
1 1/2" dia. 9 cylinder.....	35c
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MOTOR NACELLE

For 1" dia. 9 cyl. motor.....	10c
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MACH. GUN MOUNT

For 2" guns.....	5c
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PROPELLERS

2" BLAD.....	10c	2" BLAD.....	15c	3" BLAD.....	10c
2 1/2" ST.....	15c	3" ST.....	25c	3 1/2" ST.....	15c
3" ST.....	30c	4" ST.....	35c	4 1/2" ST.....	15c
4" ST.....	35c	5" ST.....	40c	5 1/2" ST.....	25c
5" ST.....	30c	6" ST.....	45c	6 1/2" ST.....	30c
6" ST.....	35c	7" ST.....	50c	7 1/2" ST.....	40c
7" ST.....	40c	8" ST.....	55c	8 1/2" ST.....	45c
8" ST.....	45c	9" ST.....	60c	9 1/2" ST.....	50c
9" ST.....	50c	10" ST.....	65c	11" ST.....	60c

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- and everything to complete models as illustrated; all in a beautiful two-tone illustrated gift box.

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at your dealer's
or by mail
10c packing charge
on one or more kits



BEECHCRAFT A17-R

The first model of this new fast cubic kit. Cruises at 205 m.p.h. Has large removable motor plate and controllable-pitch style prop. Red and white, with black details.



LUSCOMBE PHANTOM

World's finest sportplane. Has terminal velocity of 250 m.p.h. A fine flyer. Has large removable motor plate, controllable-pitch style prop, wire reinforced landing gear, and new shock-absorber inside landing gear tilt. Canary yellow with black trim.



CHESTER RACER

World's fastest lightplane. Has wire reinforced landing gear and free wheeling device inside of spinner. Green and yellow, with details in black and white.



SEVERSKY FIGHTER

New U. S. Army 230 m.p.h. cross-country trainer and pursuit. First model with new double venturi cowling. Has large removable motor plate and controllable-pitch style prop. New Army blue and yellow, with black details and full-color insignia.



FOKKER TRIPLANE

Redesigned model of Richtofen's famous World War fighter. Has wire reinforced landing gear. Flaming red with black details.



CURTISS FIGHTER F13C-1

New 280 m.p.h. Navy fighter. Model has real shock-absorber wire reinforced landing gear, large removable motor plate, and controllable-pitch style prop. Red, yellow, and silver, with black details and full-color insignia.

BERKELEY MODEL SUPPLIES
53 Berkeley Place, Dept. U-10, Brooklyn, N. Y.

graceful flights of this beautifully built model. It is believed that a new national record was set by this model, which placed second in the free-for-all towline launched glider contest.

"The following are the results of the competition. No age restrictions were imposed:

Outdoor Stick Event

Bruce Smith, Dayton.....1 min., 59 sec.
James Neff, Dayton.....1 min., 38 sec.
Robert Rice, Findlay.....1 min., 10 sec.
Hand-Launched All-Balsa Glider Event
Dale Koozer, Mansfield.....38 min., 5 sec.
Harold Crepps, Mansfield.....25 min., 5 sec.
Dick Bishop, Findlay.....25 min.,

Outdoor Fuselage Event

Jack Smith, Dayton.....21 min., 10 sec.
James Neff, Dayton.....9 min.,
Robert Rice, Findlay.....2 min., 34 sec.
Towline Launched Glider Event
James Neff, Dayton.....1 min., 31.8 sec.
Jack Smith, Dayton.....1 min., 23.4 sec.
Dale Koozer, Mansfield.....1 min., 5 sec.

Highspire, Pennsylvania

During this past summer, the United States Defensive Corps held a contest on May 1, 2, 3, and 4, 1935. We regret this event escaped our attention until the present time. The winners are as follows:

Class A—Flying Scale Models—David Barry with 90 points and Fred Knight, Jr. with 75.

Class B—Solid Scale Models—David Barry with 80 points and James Walmer with 79. Bliss Barry and Fred Knight, Jr., both tied for third place with 71 points each.

We are indebted for this information to Fred Knight, Jr., Secretary of the Corps.

New Orleans, Louisiana

Under the auspices of the local Y.M.C.A., several New Orleans boys have organized the New Orleans Model Airplane Club. At present there are sixteen members enrolled. Meetings are held twice a month, on the first and third Saturdays at 2 o'clock. Requirement for membership is the ability to secure a duration of sixty seconds. The officers are: Landry Murphy, President; Sidney Murphy, Vice-President; and David Markstein, Secretary. Mr. Bulger of the Y.M.C.A. is the director and treasurer. Informal contests are held on the second Sunday of each month. A big "free-for-all" contest was held September 8th. Model builders from all over the city, members and nonmembers, were invited to compete.

Brooklyn, New York

There is a live little club in Brooklyn under the name of the Challenge-Airs Model Aero Club, the Commander of which is Joseph R. Carbonell of 87 Ross St., Brooklyn, New York. In one of the last contests they held, the high-point winner, Robert Keegan, made a 6 min., 2/5 sec. flight in the glider event. Joseph Hofman, third place winner, made 10 min., 28 2/5 sec. in the cabin event and Ira Klein made 5 min., 40 sec. in the stick event. Second place winner was Ed Johnson with average time of 2 1/4 minutes.

Boston, Massachusetts

From editor Lewis of *Wing Overs*, the

official organ of the Jordan-Marsh-Boston Traveler Junior Aviation League, comes news of J.A.L. members. One of the outstanding incidents is the entrance of George Zeitlen and Hewitt Phillips into the portals of Massachusetts Institute of Technology. They are old model builders and have laid plans to augment their technical inclinations by studying at this excellent aeronautic engineering school.

The first indoor meet was held October 5th. The usual type of events took place. As yet no information has been received concerning the results of the contest. An active winter program is expected.

The German Air Force In the World War

(Continued from page 40)

bomber; J, armored plane; N, night bomber; S, ground fighter—also similar to CLs, but with increased horsepower—only two of these were constructed late in 1918; R, giant bombers; and V, for seaplanes.

From the start it is apparent that the Germans had a clearer comprehension of the value of their air force. The first bombing incidentally was done by Immelman, who on August 30th, 1914, after releasing a shower of small bombs on Paris, dropped a note asking for the surrender of the city, as the German troops at that time were practically at the very gates. The first fixed synchronized machine-guns on the front were mounted in German planes, while the credit for the first ship of the war shot down in combat goes to the French air service.

Until the middle of 1917, they had dominated the Western Front, and always on the Eastern Front had maintained a superiority at all times over the Russians. When Russia broke down, the air units were at once dispatched to the Western Front, proving a strong reinforcement. The construction and utilization of special types evinced the wisdom of this plan. The havoc wrought by the CL-type of specially constructed ground attack airplanes during the 1917-1918 campaign is history, at which time the Allies were using pursuit and reconnaissance machines for such missions.

Probably no finer tribute has ever been paid any hostile army than that which has been paid the German Air Force by those Allied airmen who opposed it. Its spirit of aggressiveness and the sportsmanship of its pilots made it a worthy foe, and it was the only branch of the German Army that did not desert its colors when revolt and dissension swept the land, which resulted in the Armistice.

Build and Fly this Famous Racer

(Continued from page 31)

the spar has been slipped into place, the remaining opening can be filled with balsa or covered with paper. Cut 2 slots in the tail block to insert the front and rear spars of the elevator and cement it in place. Cement the rudder in place and allow to dry.

Now fasten the windscreen in place.

The power plant consists of 8 strands of 3/8" flat rubber for highspeed flights, or 6 strands for slow flights.

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a whole year's subscription to MODEL AIRPLANE NEWS

Christmas comes but once a year—but here's one offer that makes it come every month for an entire year. Whether you take advantage of this offer for yourself or for some other interested enthusiast, there is no guessing as to how big it will go over.

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BOEING P26A (SOLID)

A 1/8" solid scale model that is authentically designed to the most minute detail.—fourteen, inspection patches. Motor complete to spark plug leads (you make all). A joy to build and a contest winner. Colors, army, yellow and olive with full insignia. Full size plan with all details. 50c value.



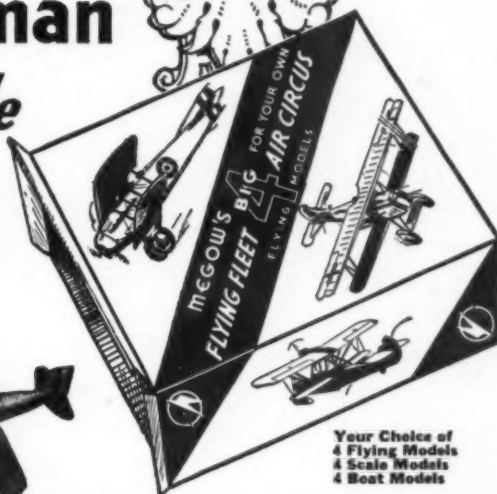
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Army's new streamlined fighter. Flies far and fast. Contains finished balsa cowl and other machined parts. An excellent model . . . one that any builder will be proud of. 50c value.



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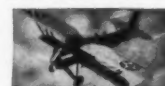
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